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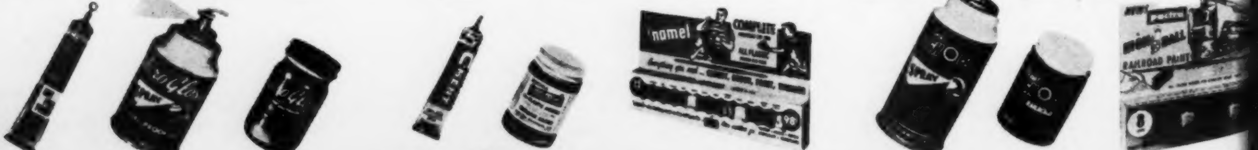

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# MODEL AIRPLANE NEWS

26th Year of Publication

JANUARY 1955 Vol. LII—No. 1


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by William Winter

▶ Whoever said that rules were made to be broken might have added, "but not changed." In hammering a new event into shape, rules do have to be revised but, once accepted, they remain basically unchanged, year in and year out. Under our self-imposed system, which casts the Contest Board as a kind of neutral observer, it is asking too much to want direct action on, or solutions to, the perennial problems of certain events, in which rule changes have crept with the speed of a glacier. Which brings us up to the subject of this month's opus: PAA Load Rules or Dallas Sherman Rides Again! Briefly, Pan American has rewritten the PAA Load rules. The changes are big, exciting and, for the most part, cannily made. Sherman, alias "PAA Load Pappy," probably does more thinking about model airplane rules than any man in the U. S. When it comes to relating rules to performance, and keeping rules up to the minute, he's a man of action. This isn't buttering up the old boy, but is merely a dazed observation.

Covering the rule changes just sent out to all known payloaders, George Gardner, Educational Director for Pan American World Airways, matter of factly stated: "For the first time . . . we are proposing a basic revision in the rules. We have augmented the original concept of PAA Load event by adding other classifications. We started with a classification for Class B free flight only, then added Class A and Half-A, then Clipper Cargo and PAA Load Event for rubber powered models. And various adjustments have been made from time to time. This time the changes are fundamental.

". . . Rapid technological advances in modeling have caught up with us. What started as a definite challenge to the free flighters is getting to be a shoo-in. Our rules are too easy. (*Continued on page 48*)

**PLANE ON THE COVER**

*For its day, the Vickers Vampire Scout was a remarkable aircraft, if only for the mad "bird cage" construction of struts and wires so often resorted to in the first World War by the British. Skillfully rendered by cover artist Jo Kotula, the Vampire is pictured almost photographically, yet artistically, to the probable delight of fans of that era. Our version of the Scout was a trench strafer, which explains the pusher arrangement. Weighing 1,870 pounds empty, the Vampire toted around 500 pounds of armor. Did 121 mph on 200 hp. The times have changed!*

**NEXT MONTH'S COVER**

*The mighty Avro Vulcan, four-jet delta bomber, featured on the February cover. One of Britain's big three atomic bombers, the Vulcan is opposite-pole approach to US jet bomber design, the thin, heavily loaded wing of the Boeing B-47 being the other extreme. Span is 99 ft.; length, 97 ft. 1 in. Powered by four Bristol Olympus turbojets, betters 600 mph. Great range.*


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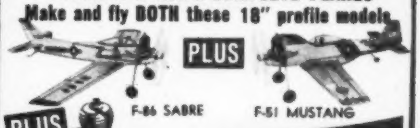


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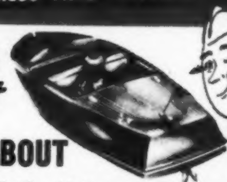

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# Flash News

Many developments push back the air frontier -- this monthly report will keep you in the know.

By ROBERT McLARREN

Air Force has placed orders for the production of two secret supersonic combat aircraft, the Convair B-58 Hustler bomber and the Lockheed F-104 fighter. Although the quantities involved and the size of the contracts are not revealed, Secretary of the Air Force Harold Talbott earlier announced plans for the placing of about $100-million worth of new orders for supersonic fighters and bombers.

The Convair B-58 has not been completed yet but it is known to be a giant delta-wing supersonic bomber powered by four General Electric J79-GE-3 turbojet engines of 15,000 lb. static thrust and 20,000 lb. of thrust with afterburning. The engines are mounted in individual pods slung along beneath the wing. The delta-wing bomber is designed to cruise at high subsonic speed and be capable of supersonic speed during its high-altitude dash over the target.

The tiny Lockheed F-104 is the Air Force answer to the "lightweight" fighter concept now sweeping the air forces of the world. Powered by a Wright J65-W-7 of 7800 lb. static thrust, the new fighter has tiny, straight wings, expressing the conviction of Lockheed's "Kelly" Johnson that the straight wing is ideal for supersonic speed. The F-104 has been undergoing secret flight tests at the Air Force's Flight Test Center, Muroc, Calif., since last February.

The United States has spent nearly $2-billion on guided missiles since the beginning of the Korean War in June, 1950 and has more than a half-billion available to finance current projects. The U.S. Army has been the most active in the field, having already spent $743-million for research, development and production. The Air Force has the second largest program, having spent $596-million. The Navy has spent $554-million on its guided missiles.

The Marine Corps has completed successful experiments with a "rocket boost" system for helicopters. Developed by Reaction Motors under a Navy contract, the system consists of small rocket motors on the rotor tips of a Sikorsky HRS-2 weighing only 1 lb. each. These three motors are fed hydrogen peroxide from a central tank mounted atop the rotor hub. The complete system weighs only 67 lb. yet provides a 20 per cent increase in the helicopter's weight. The fuel tank carries a six-minute supply, enough for 20-25 assisted take-offs at substantially increased useful load.

Air Force has decided to bring the "Italian Sabre" home, following two years of production of the North American F-86K by Fiat. North American has received a quantity production contract for the F-86K to be built at the parent Inglewood, Calif., plant. The Hughes E-4 fire control system will be replaced by a new system developed in North American's own Downey, Calif., Aerophysics Laboratory. The new "K" model will be armed by four new 22-mm cannon, requiring an increase of 8 in. in length of the fuselage. Power is a General Electric J47-GE-33 turbojet engine of 5,600 lb. static thrust but of more than 7,500 lb. with afterburning. Similar in appearance to the F-86D all-weather fighter, the "K" has been undergoing tooling and parts production by Fiat under the MDAP program for NATO nations.

The Air Force long-range guided missile program is apparently nearing assurances of success with the news that negotiations are now under way to extend the Air Force Missile Test Center range from its present 800 miles (from Patrick Air Force Base, Cocoa, Fla. to Grand Turk Island) to 5,000 miles (Ascension Island in the South Atlantic about mid-way between Africa and Brazil). First intercontinental missile to be tested over the range will be the Northrop B-62 Snark, a pilotless bomber powered by an Allison J71 turbojet engine and capable of cruising this 5,000-mile range at about 600 mph. First of the new missiles is already undergoing preliminary tests at Patrick AFB while the State Department completes negotiations with London for permission to build a USAF research station on Ascension.

Available air travel statistics make it appear inevitable that the United States will lose its trans-Atlantic air service leadership this year for the first time since scheduled service was inaugurated. The race tightened last year when U.S. carriers transported 253,800 passengers and

(cont'd on page 46)

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Both top and bottom wings knock off in event of a crash or, shall we say, hard landing? Excepting airwheels and stabilizer area, everything is to scale.

# The SE-5

**by CHET LANZO**

▼

***Flown with notable success both as a free flight and radio controlled job, this man-sized scale model of famous SE-5 fighter is unforgettable.***

▶ Flying scale models of the familiar SE-5A pursuit airplane of World War I have always shown excellent flight characteristics. Having built quite a few free flight models of this ship in the past, I felt that it would make a good radio control scale model. Subsequent radio control and free flight trials have proved it a sweet flying job.

This model is true scale with but two deviations from the full size plane: larger than scale wheels are used and stab area has been increased. The air wheels have proved to be well worth the slight loss in scale appearance because of the amount of shock and beating the landing gear takes. The elevator area has been increased slightly to 20 per cent of the wing area to improve flight stability.

Rugged construction is very important in a radio control job and the general beefing up of this model with plywood

The British SE-5 of World War I fame is one of the very few full size machines that incorporate adequate dihedral for model flying purposes.

Chet Lanzo, who designed the SE-5, is one of the greatest competition fliers of modeling history and specializes in rubber and scale aircraft.

and wire has paid off after a number of hot landings. The SE-5 has flown into trees of the thorn apple variety without any apparent damage. Adding to the crash resisting ability of the plane are the knock-off upper and lower wing panels, stab and wing struts. On a few occasions previous to the installation of the radio control gear, the model was flown free flight with very satisfactory results. The biplane configuration with the upper wing set at plus 2 to 3° and the lower wing at zero° incidence makes a very stable arrangement.

The upper wing goes into a stall sooner than the lower wing at high angles of attack, and with the coupling about the CG produces a restoring moment without the usual loss in altitude accompanying a normal stall.

Experience with the ED 2.46 cc Diesel shows it makes a reliable, easy-starting power plant which I recommend highly, although almost any .15 glow plug engine will produce more than adequate power for this ship.

Some difficulty was experienced with the single hard tube receiver installations because of the large amount of wire used in the bird cage type of wing mount. Upon grounding of the wire to the B Minus side of the receiver, this difficulty disappeared. Warping up the trailing edges (washout) of all four of the wing tips to about 1/2 in. produces a model with improved stability in turns under power and in glide.

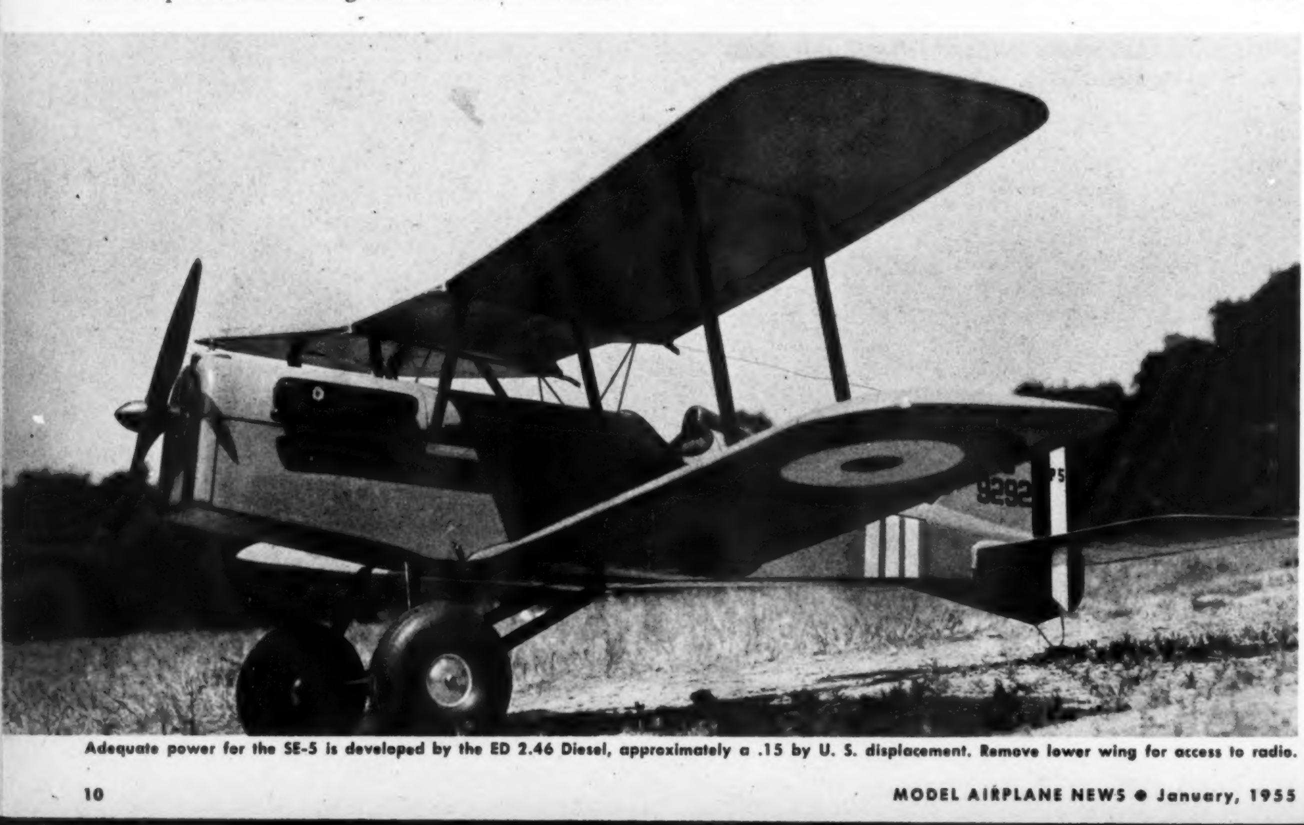
Top and bottom wing panels are built flat over plans, dihedral being added later. Upper and lower wings are identical except the lower wing has the interplane strut hooks on the upper surface. Pin down pre-shaped leading and trailing edges, then add ribs. Next, wing tips and center section blocks. Put in 2-3/4 in. dihedral angle and spars and 1/16 dihedral braces of plywood. Sheet the center section and cover the completed panels with silk. Stab is constructed in a manner similar to that of the wings.

To construct fuselage, cut from 1/16 in. plywood the two side pieces that extend from the nose to former No. 3. Place in position on plan. Pin down 1/8 x 1/2 in. longerons and cement in 1/8 in. sq. vertical pieces. Remove from plan and cement on 1/8 sheet outer covering. Cement body sides to former No. 1. Add nose former and fill in remaining cross-pieces and formers.

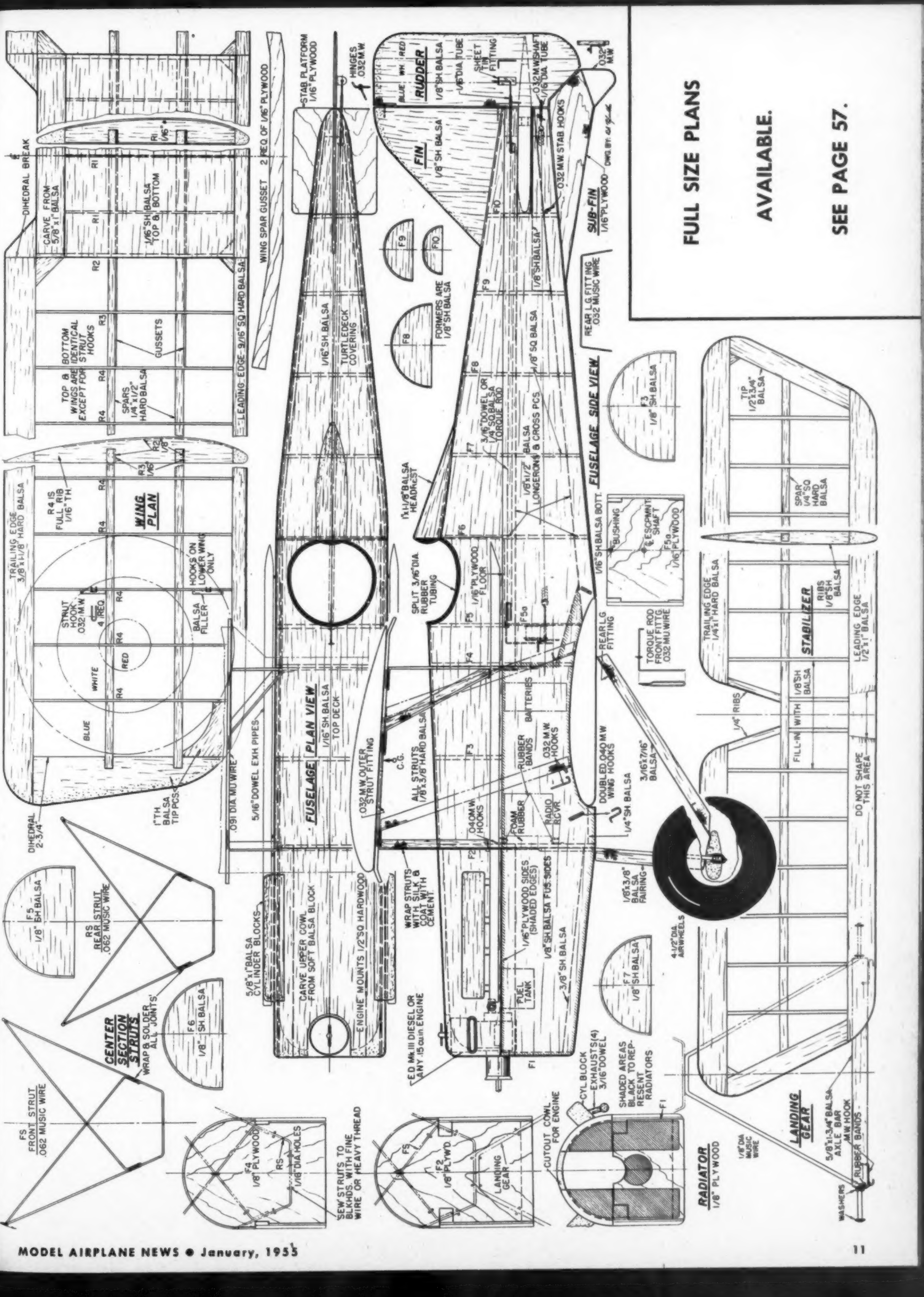
After assembling wire wing mount and bending landing gear to shape, secure in place with copper wire and plenty of cement. Rudder and fin are of solid 1/8 sheet. Cover formers with 1/16 sheet balsa and, upon completion, the body is covered with silk.

Installation of receiver is conventional: any commercial set may be used. I built a one-tube receiver and used a standard two-position escapement. A convenient location for the switches and meter jack is the easily accessible open cockpit.

Radio tuning and adjusting are done with the lower wing removed. END



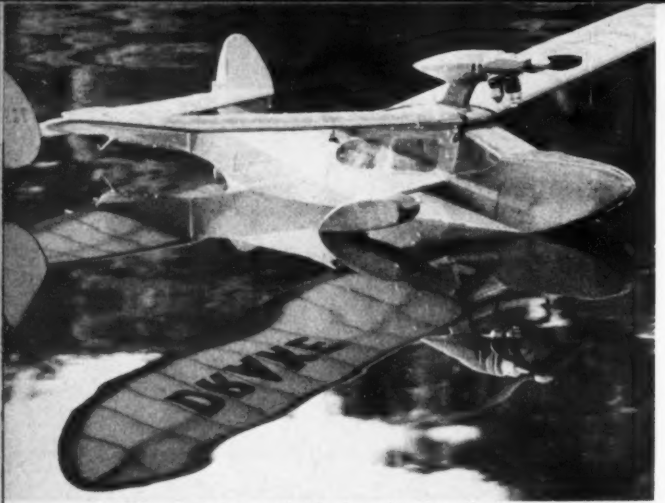

Adequate power for the SE-5 is developed by the ED 2.46 Diesel, approximately a .15 by U. S. displacement. Remove lower wing for access to radio.




FULL SIZE PLANS

AVAILABLE.

SEE PAGE 57.



Ken Willard's Drake—spelled backward in the reflection—rides lightly on the water. Half-A powered design, it was one of the most popular ever.

# FACTS about Flying Boats

***Good technical articles like this one are few and far between. Believing that all articles that really contribute to the art should be published, MAN is happy to print this two-part discussion.***

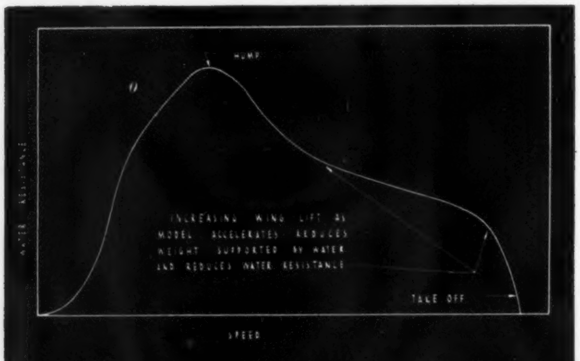



FIG #1 WATER RESISTANCE CURVE OF CONVENTIONAL HULL AT "BEST TRIM" ANGLE

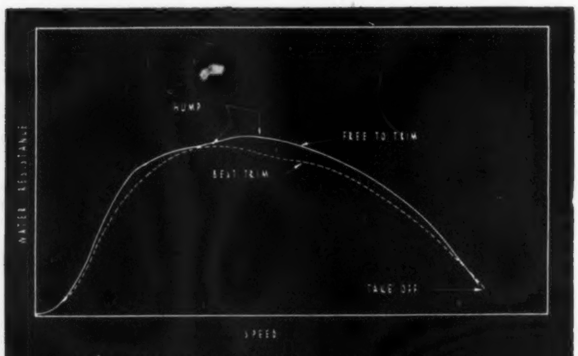



FIG #3 WATER RESISTANCE CURVES OF PLANING TAIL HULL
NOTE LOW HUMP COMPARED TO FIG #1

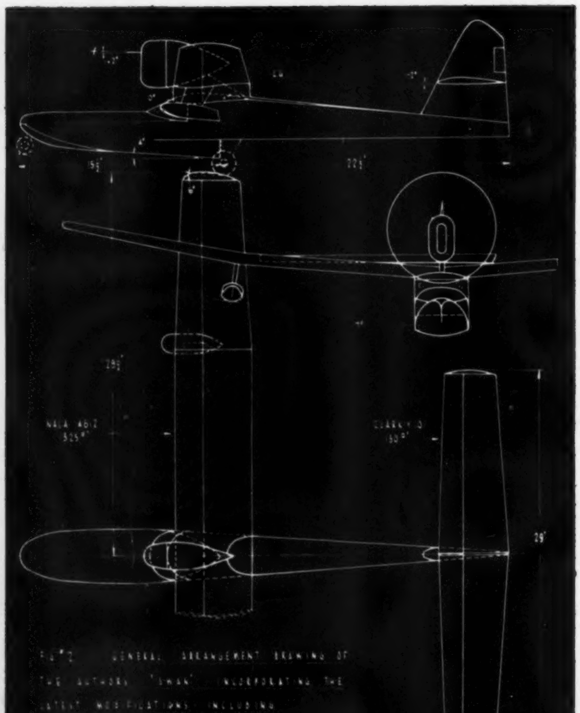



FIG #2 GENERAL ARRANGEMENT DRAWING OF THE AUTHORS "SWAN" INCORPORATING THE LATEST MODIFICATIONS INCLUDING DEMOUNTABLE TRICYCLE GEAR

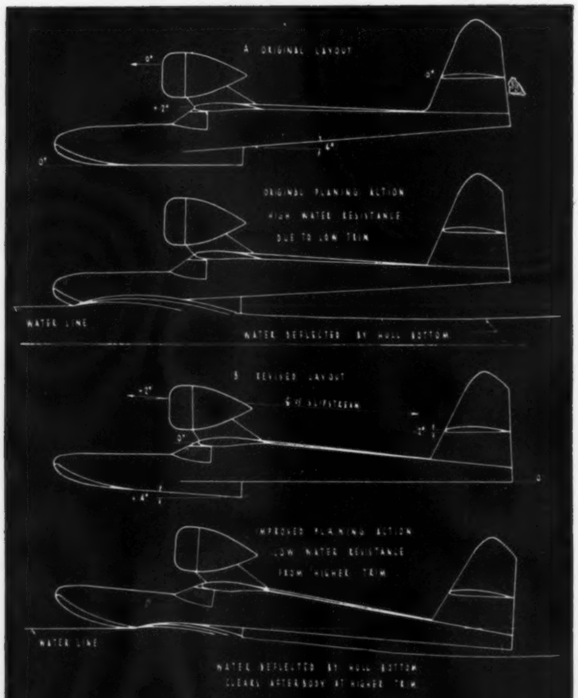



FIG #4 GRAPHIC EXPLANATION OF IMPROVED PLANING ACTION BY REVISING WING-THRUST AND HULL SETTINGS

Watching Harry Fosbury start Orwick .29 engine is Homer Snyder, who made plane. Modified Flamingo kit (gone forever, boys!) is ROW beaut.

Specializing in flying boats for many years is C. D. Bowden of England, who designed this "small" 5 ft. 6 in. job to be flown by radio control.

**by A. G. LENNON**

▸ Many of us have seen otherwise well designed flying boats that just wouldn't take off. They were great disappointments to their designers although, when-hand launched, they flew well.

The obvious reason for their lack of success was, of course, that the water resistance of the hull was so great that the motor was unable to accelerate the model to take-off speed. Let's take a brief look at the causes of this resistance.

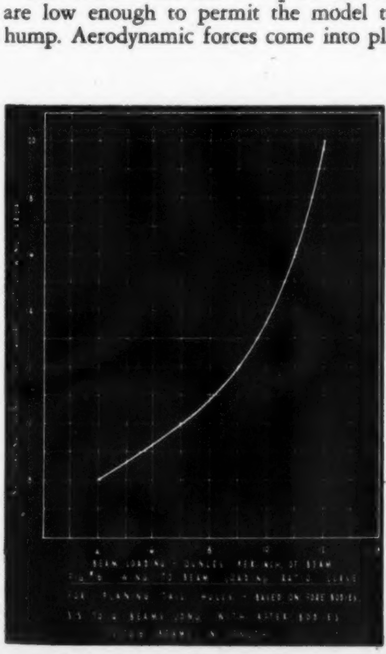
Early in the take-off run there is a period of high resisttance called the "hump" (Fig. 1) which has to be overcome to get the model "on the step." This hump occurs as the ship rises on the bottom surfaces and commences to plane on the water.

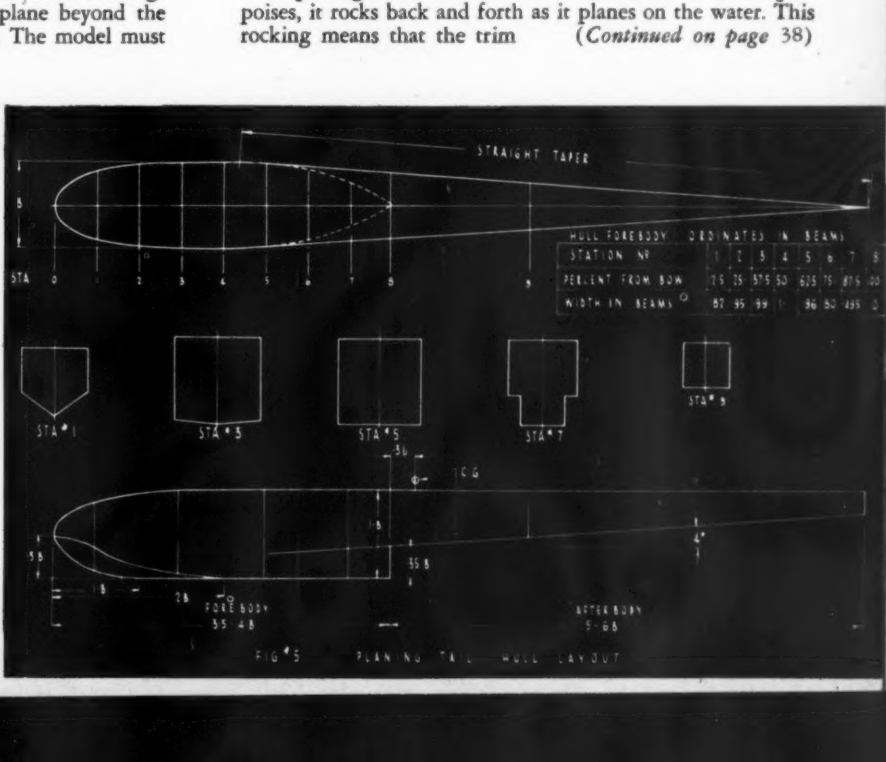
This hump resistance is dependent on two factors: the shape of the hull itself and the beam loading. Let's consider beam loading. This is the weight of the model divided by the beam (which is the widest point of the hull at or near the step). Beam loading is similar to wing loading. The higher both are, the faster the model must move for successful flight, and hence both demand more power. Correct beam loading is therefore a must.

Let's assume the hull hump resistance and beam loadings are low enough to permit the model to plane beyond the hump. Aerodynamic forces come into play. The model must then continue to accelerate up to flying speed to take off. Hull bottoms all have some angle, called the "angle of best trim," at which their planing resistance is lowest. However, this angle may not be the same as the "free to trim" angle, or the angle at which the hull tends to plane naturally, and hence the resistance at this latter angle is higher. In full scale, the pilot, by using elevators after the hump has passed, can control this angle and bring it close to the best trim angle for quickest take-off. Models, in contrast, must have their wing and tail surfaces set at such an angle to the hull that, as speed increases, these air surfaces will tend toward a level flight attitude and will hold the hull at or near the best trim angle until take-off speed is obtained.

Another factor in hull design is Vee bottom, which is used in full scale practice to reduce shock loads on the hull. Except at the bow, it has little place in model design since it increases resistance and reduces planing efficiency. As the Vee cuts through the water, it creates a lateral wave in each side which uses up some of the urgently needed power. Full scale data indicates that a hull with a 20° Vee needs twice as much planing area as a flat bottom, hence more beam. You have all skipped stones; were you ever successful in skipping one that wasn't flat?

Porpoising is another take-off deterrent. If a model porpoises, it rocks back and forth as it planes on the water. This rocking means that the trim (*Continued on page* 38)






| HULL FOREBODY ORDINATES IN BEAMS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| STATION Nº | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| PERCENT FROM BOW | 7.5 | 25 | 37.5 | 50 | 62.5 | 75 | 87.5 | 100 |
| WIDTH IN BEAMS | .87 | .95 | .99 | 1. | .96 | .80 | .495 | 0 |


Nobody may have no body, but it isn't a nobody when it comes to giving the other fellow the works.

# Nobody

**By DON STILL**

***National Open Stunt Champ comes up with the ultimate combat job. Irreducible minimum in planes, maximum performance.***

▶ When you get to thinking about it, there have not been so many combat designs presented in magazines. Also, there aren't very many kits on the market. This could very well be the reason for seeing so many clunkers at every contest. Even at the Nationals, the number of junks was amazing. Maybe it is the rules that keep the fellows using such ships for combat, and if it is, the rules need changing; but, if it is the lack of designs, I hope this little "Nobody" will do something for somebody. I won't say this ship has everything, won't say it is the fastest, the smallest, the lightest or the tightest turning. All I will claim is that it is a combination of the things that I like most in a combat model and I will further explain my likes and dislikes.

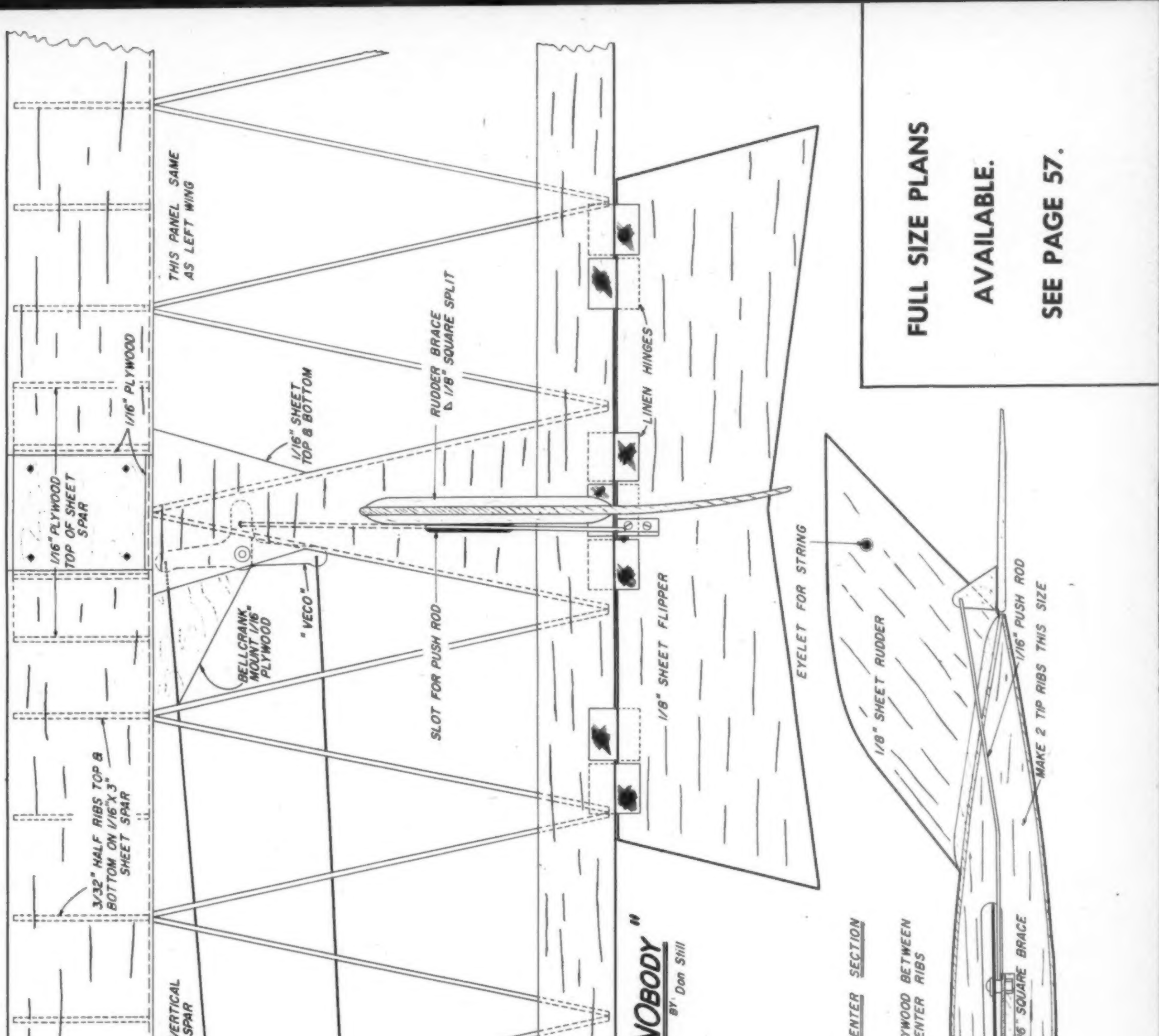
Strength! When some one mentions combat, what comes to mind? Crack-ups! Mid-air collisions! Tangled lines! These are the things that make combat, but they are the things that unmake combat fliers. In the Nobody, I guess strength was the first consideration. To achieve strength without the addition of weight, something had to go. In U-control, the most unnecessary thing is the "body," so no body means less weight, this weight being put to better advantage in the wing construction.

A close look at the plans will show you all the sheet wood goes on the leading edge of the wing where it is most needed. The four sheets of 1/16 in. balsa that make up the leading edge are arranged as follows: a vertical sheet spar, to take the wing loading strain; a horizontal sheet spar, to take collisions, prop cuts and "quick stops"; two sheets of covering for additional strength and smoother airflow over the wing. Even with all this wood, in the most direct mid-air smash-up, pieces will fall, but just try and demolish it by hitting the ground. No kidding, it is almost impossible. My first Nobody lasted a season and a half through 12 mishaps, four mid-air, and eight hard landings (some straight in from overhead.) Usually, a new strip of paper here or there would fix her up—repairs that could be done on the field. Never were the basic members of the structure damaged. My whole theory is radical to most combaters' ways of thinking. They use very flimsy construction in the hope of saving time in building. This I believe to be a misconception. Why spend four to six hours on a plane that might last three minutes rather than spend eight hours on one that will last all season (with some luck)?

Don Still and the agile wing. It is stable as well as maneuverable. With K & B .35, it's in a hurry.


No one will complain about construction time or difficulty with the Nobody. After all, you have no fuselage or stabilizer to make, just the wing, flipper, rudder and motor mounts. With the rudder, elevator, and mounts being solid, the only "construction" is in the wing. Here you will find simplicity and strength. It is the familiar "D-tube" type with slight modification; the addition of a sheet spar in the center of the "D" with half ribs on each side. A 1/16 x 2 x 36 in. sheet balsa spar serves for the basic member of the "D" and the spar from which construction is started.

First select a mid-hard sheet of balsa for this purpose, and mark a line down the exact center of it. Lay it down flat and cement (*Continued on page* 52)




FULL SIZE PLANS AVAILABLE. SEE PAGE 57.

Basil Miles, designer of the .213 Hunter Diesel, checks powerplant for the Allen-Redlich project on the eve of the cross-channel.

Big moment, as Roger Clark launches 6-foot Radio Queen (with three pints of fuel aboard) on its historic 22 mile flight across the Channel to Calais in France.

# CHANNEL HOP!

By BILL DEAN

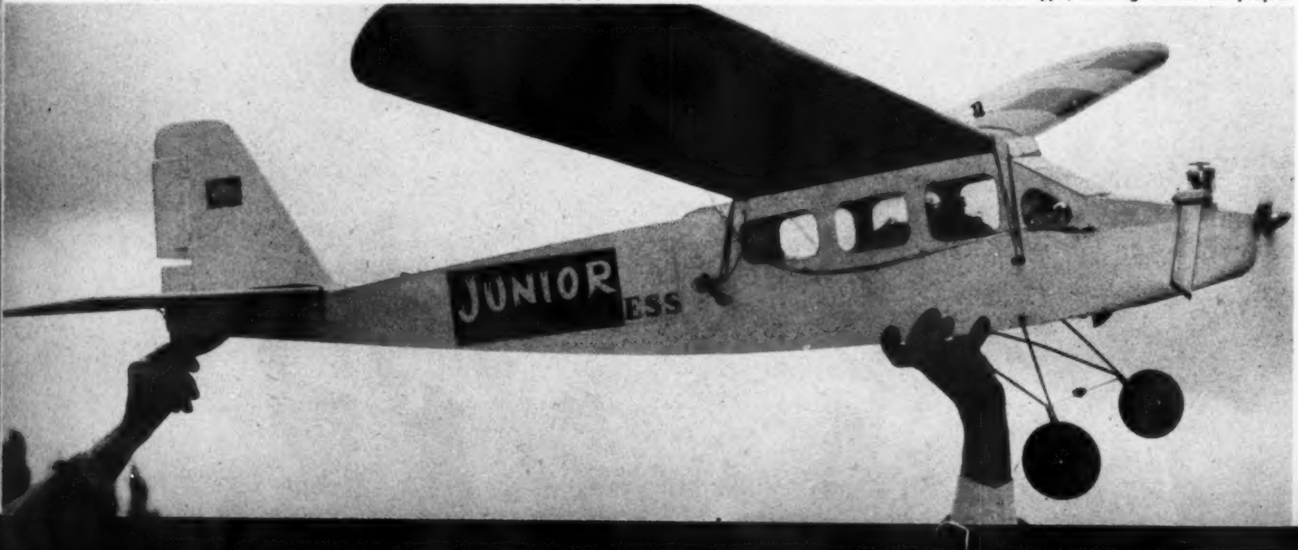
▼

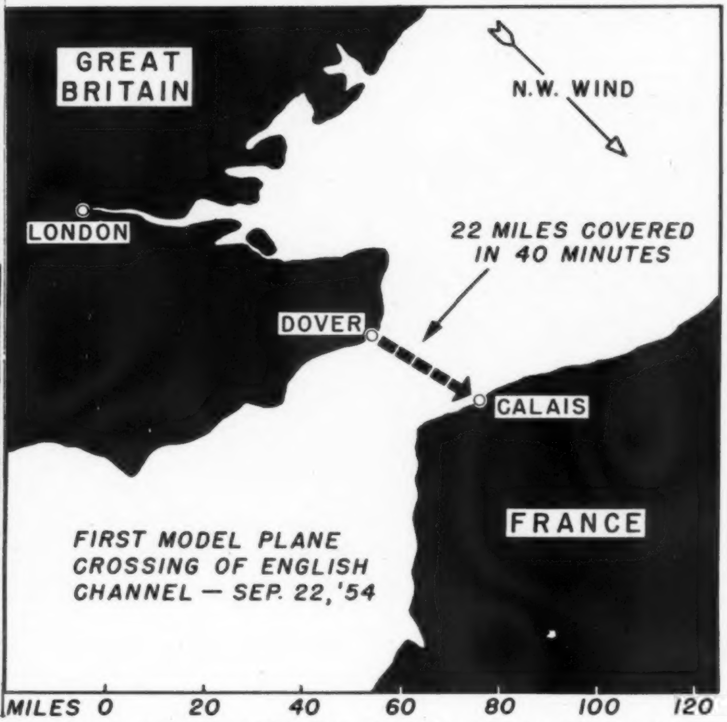
***The world went wild 45 years ago when Louis Bleriot flew the English Channel. Now the crossing has been made by model airplane, taking only three more minutes than did the great French aviator. Here is the story behind that exploit with pictures, by courtesy of the London Daily Express.***

▶ Ever since RC flying got under way in the 'thirties, modelers on both sides of the English Channel have been dreaming of the day when a model plane would fly along the same sky trail blazed by Louis Bleriot on his epoch-making hop across the 22-mile wide strip of water, 45 years ago. The dream at last became reality on Wednesday, September 22 of this year, when Londoners Sid Allen and George Redlich guided their 6-ft. span Radio Queen across the "ditch" from the white cliffs of Dover to Calais, France. Total time for the crossing was 40 minutes—just three minutes longer than Bleriot's own hazardous trip in his flimsy XI Monoplane back in 1909!

Ranking as one of the most important firsts in the history of model aviation, the flight was especially notable since only standard model equipment, of the type available in any British or American hobby store, was used. The actual model

No beauty, the first across-the-channel plane is an ED kit, popular abroad. The radio is an ED Mk. 4 three-tube type, making an all ED project.






**During the 40 minute Dover-Calais flight, the model attained 3,100 feet after 17 minutes, had to be spun down 1,100 feet. The ceiling was estimated to be 4,500 feet.**


**Sid Allen, noted British RC flier, placing air mail letter aboard. Note the two transparent fuel tanks in wing.**

was built from a well known kit design by Col. Taplin, which has probably won more contests than any other RC type, including two firsts at the '54 British Nats. Radio was an ED Mk. 4 Miniature Three-Reed type and the powerplant was an ED .213 cu. in. Hunter Diesel.

For several months prior to the crossing, Sid and George logged dozens of long-duration test flights, checking out various tank schemes, and generally satisfied themselves that it could be done. Basil Miles, ED's engine designer, personally okayed the veteran powerplant and found that no special tuning was needed; twin wing-tanks were fitted (feeding a float-chamber behind Diesel) and a long downward-pointing exhaust was fitted to keep the radio compartment under the wing free from waste fuel.

Over the past few years, several much-heralded "channel attempts" fizzled out and the newspaper boys have been becoming increasingly bored by the "I'm planning to fly the Channel" utterences of the beep box characters. However after hearing all about the carefully laid plans for the Allen-Redlich flight, the Daily Express—one of the world's two largest newspapers—quickly jumped on the "Bleriot rides again" band-wagon and from that point there was simply no turning back! Additional interest developed when it was learned that a rival group headed by Ballard who hit the headlines in '52 by making the channel crossing with an RC model boat, were also planning a model plane crossing, escorted in this case by a fast motor launch.

When the big day dawned, everything was just fine from the publicity angle, with a light plane all ready to follow the model, British Customs Officers giving clearance and even an air mail letter being sealed in the cabin! The only thing that remained was the (*Continued on page* 51)

**Customs Officer clearing the Radio Queen before its take-off from the white cliffs of Dover. Numerous long-duration test flights had been made.**


**George Redlich, the radio expert, in cockpit of Auster Autocrat, from which he controlled model. Control was maintained throughout the flight.**

Thought this picture might have been taken late on a summer's afternoon, 25 years ago. This particular Robin is flying these days on Half-A.

# CURTISS ROBIN

**by GARY G. WITT**

***One of the greatest planes ever designed, from a modeler's point of view, is this old favorite. It looks good, has simple lines, performs on .049's.***

In 1928 the Curtiss Aeroplane and Motor Co., Inc., produced what was destined to become one of America's No. One flying scale models. Used already for RC and rubber scale, the Curtiss Robin makes its most recent come-back as a Half-A flying scale entrant. Perhaps this will not be the Robins' most eventful career but undoubtedly it will make its mark in the Half-A flying scale event.

The OX-5 powered Robin illustrated here can be modified to the radial engine Challenger version with very little research and rework of the drawing. To those ambitious modelers who wish to be different, the radial engine will provide hours of delicate scale work.

The construction of the model requires special attention at several points. In the construction of the fuselage, the modeler should attach well the plywood frame around the top of the cabin. This frame helps prevent damage to the fuselage from the wing hold-down hooks.

Cabin details should include those shown on the plan plus some instruments on the cabin side of the firewall.

Build up the shock absorbing landing gear by soldering two short pieces of brass tubing of 1/16 ID to a piece of music wire (use acid core solder and a hot iron). Make the "U" struts (shown in LG detail) with legs spaced to slide smoothly into the brass tubes. Cut a slotted hole in the "suit case" shock absorber and cement around the tubes. Trim "U" strut to proper length after assembly.

The wing lift struts are removable with the lower end "friction" fitting into the tubes secured in the fuselage. Install the struts directly after the wing. Attach front and rear wing hooks at leading edge and spar, respectively, before covering bottom center section.

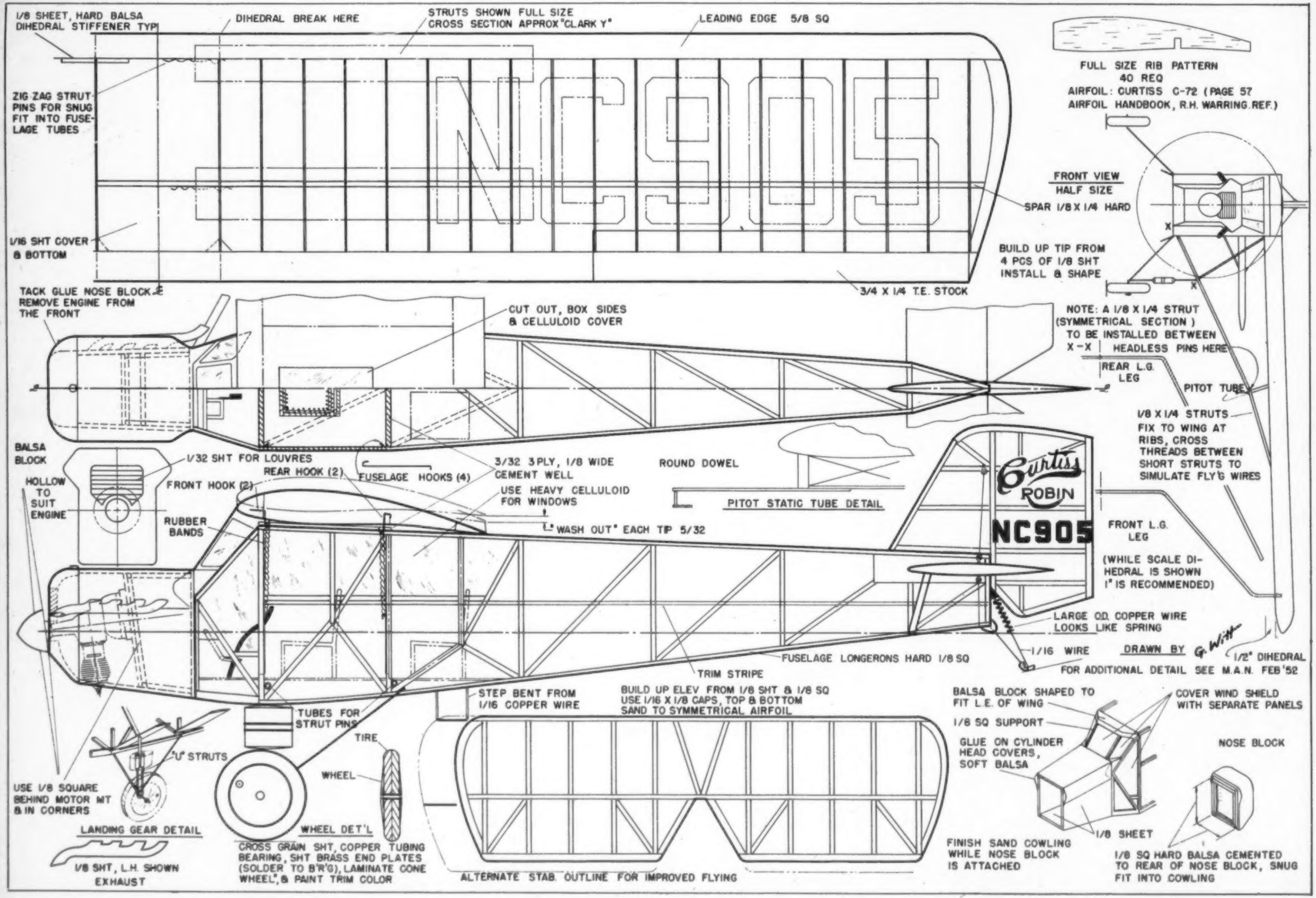
Flying wires between rudder and elevator add strength and eye appeal; be sure to include them.

The author has seen only two Robins. Both had contrasting fuselage, wing and empennage. A moderate finish is a good finish for a Robin. Remember, it was a 1928 production airplane.

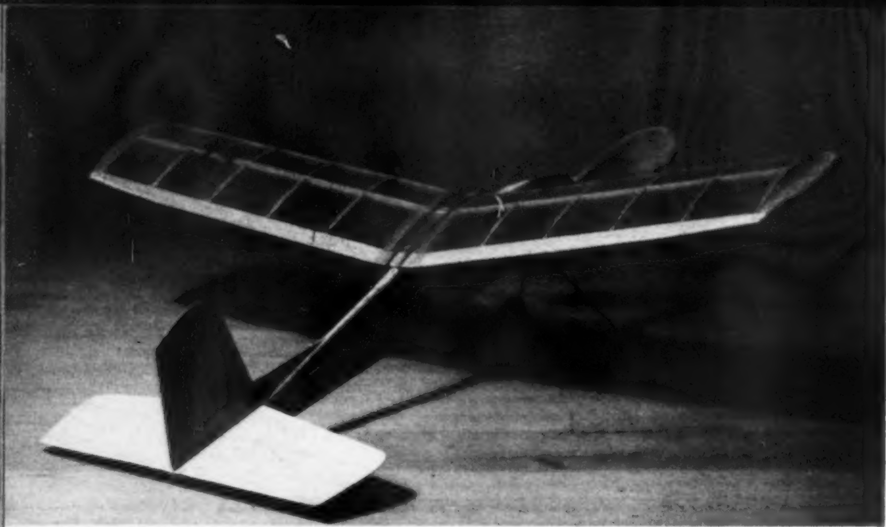
Build up the cowling assembly (*Continued on page* 50)

The author releases his Robin for ROG take-off at the Flightmasters' contest. Only 15th this year, this ship took first last year when still new.

Come on, you old timers, stop dreaming! Incidentally, wings come off, struts detach, so it's a knock-apart construction without ugly rubber bands.




**FULL SIZE PLANS AVAILABLE. SEE PAGE 57.**



Simple, robust construction should enable youngest reader to duplicate this natty looking craft. Although balsa profile fuselage helps beginners, the built-up wing takes ship out of all-wood class.

After cutting out fuselage, add wing platform, nose reinforcement, landing gear, as shown here.

# TUFNUT

***Full size plans in magazine, detailed step-by-step construction notes, make this delightful little rubber job a quickie project for that sport flying.***

**by P. G. F. CHINN**

"To: The Editor,
Model Airplane News.
"Dear Sir,

Recently I took up building model planes. I bought a rubber driven model but when I tried to assemble it, I ran into trouble. My wing was crooked and when I tried to paper it, the paper wrinkled and I couldn't seem to get the rounded body at all . . ."

This is part of a letter received recently by MAN. It is typical of a number of such letters regularly reaching this magazine. So the editor conducted a little research: he found that model building loses vast numbers of promising new members through beginners' failing to complete their first model successfully and he found out some of the reasons for such failures.

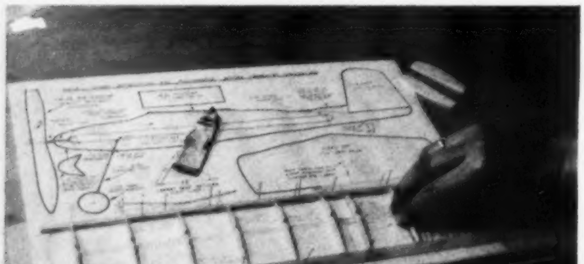
Firstly, of course, there is the age-old problem of the beginner trying to build something that looks good on paper but is much too tricky or tedious for him to tackle at such an early stage.

Secondly, there is a tendency for designers and manufacturers to over-emphasize performance. For high performance, a high power-to-weight ratio is needed and that means a light and relatively flimsy model. A flimsy model not only breaks when it hits something; it is difficult to keep in shape when you cover it, through the lack of rigidity in the framework. Moreover, such a model doesn't even have to crash to get broken: it can all too easily be accidentally damaged in handling. All this means that our "high performance" model will probably never get into the air, or, if it does, it will never get a chance to perform as the designer intended. Besides, long flights really aren't necessary. You will be surprised to see how long even a 20 or 30 second flight really is and how thrilling it can be.

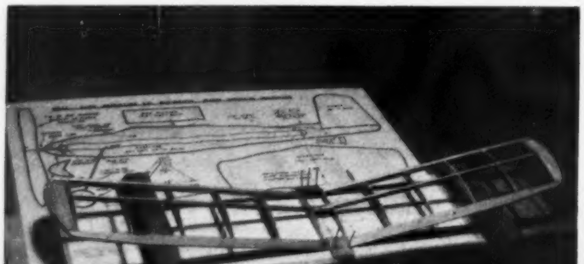
So, bearing all these points in mind, we set about trying to provide a model design and construction feature that would give the beginner a better chance of success. "Tufnut" is the result.

At first, we had intended to make it a traditional "stick" model. We chose, instead, the profile-fuselage type for three reasons: it is stronger, it rules out the need for making a special metal propeller bracket and it looks more attractive.

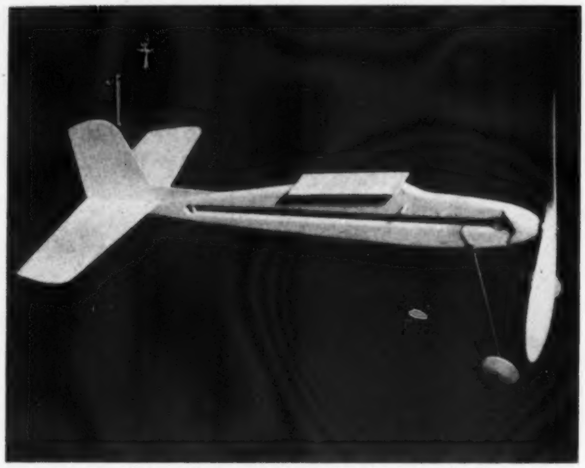
To answer our second requirement, we have made the plans as easy to understand as possible and supplemented them with a series of photographs, taken during the construction of the original model, to show the various stages



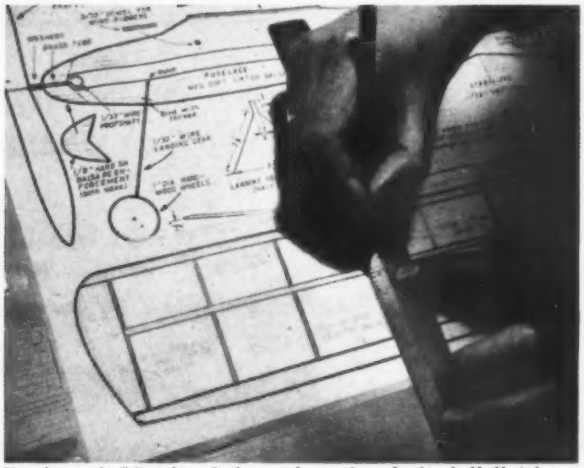
Cover plan with transparent wax paper and assemble wing by pinning down parts shown and cementing ribs in place. Wing spar goes on top.



When wing is built, notch leading and trailing edges at the dihedral break and block up each panel to form correct dihedral angle. Cement.



To finished fuselage add prop shaft and bearing, wheels. Cement, temporarily pin stabilizer in place, then the vertical tail surface and fin.



Pin plan to building board, then make tracing of wing-half. Use drawing to complete wing plan as seen, bottom, outside photo opposite page.

in its assembly. These pictures are referred to in the detailed instructions which we shall come to in a moment.

In answer to our third point, Tufnut really is tough. We gave the original model to two young friends of ours who immediately flew it into the side of a shed and then crashed it several times in quick succession because of their inexperience, but it came through with no damage.

The solid 1/4 in. sheet balsa fuselage is stronger than one of built-up strip balsa and tissue. The tail unit is simply cut from 1/32 in. sheet, which is quite strong enough, and this, and the various fittings, such as landing gear and prop assembly, are fixed with a minimum of trouble. For utmost ease of construction, the wing, like the tail, could have been made of sheet balsa, but such over-simplification does little to prepare the beginner for bigger and better projects and so we have provided an efficient double-surfaced, built-up wing which is of sufficiently heavy construction to simplify covering and resist damage in a crash.

The ready-made wheels may be of hardwood plastic, either of which can be obtained from your local model dealer. You can use a ready-made prop, too. We used a 7 in. Kaysun plastic prop supplied by America's Hobby Center. For longer flights, you can use an 8 in. saw-cut balsa prop, if you don't mind a little extra work finishing it off.

Before you attempt to start construction, take a good look at the full size plan printed here and study all the photos. We would also recommend that you read through the rest of this article so that you are quite sure that you understand everything in advance. In this way you will eliminate the likelihood of making a mistake and having to rebuild any parts.

The first thing to do is to cut out the various sheet balsa parts. To do this, detach plan and trace outlines onto the wood with a piece of carbon paper laid under the plan. Make sure that you have the grain of the wood running in the right direction as indicated on the plan. Note, for example, that the grain of the rudder runs vertically, not across. Don't use warped balsawood, especially in the case of the 1/32 in. material for the tail surfaces.

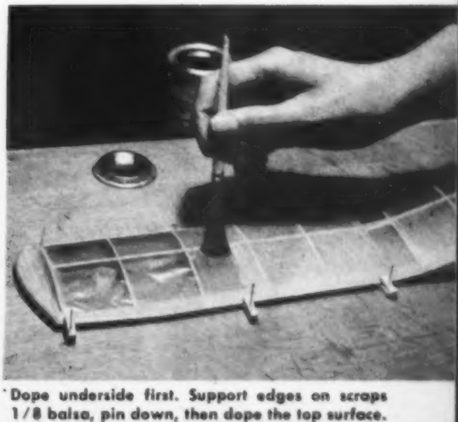
For cutting out the parts, use a modeling knife or a steel backed razor blade. Keep the blade upright, especially when cutting thick wood, such as the fuselage. When making the wing ribs, you may use one of two methods. The first method is to cut out all the ribs individually: an aid here is to make a thin metal or plywood pattern to the shape of the rib, as given on the plan, and then to lay this on the balsa and cut around it. The second method is to pin together 12 pieces of 1/16 in. sheet balsa, each measuring 2-11/16 in. x 3/8 in., to form a block 3/4 in. thick. The top of this block is then rounded off with a sandpaper block to obtain the required rib shape and, after cutting the slot for the spar, the finished ribs are separated.

When bending the landing gear, use a pair of pliers and start from the center, where the legs join the fuselage. A shallow slot, or notch, is cut in the fuselage at this point and the landing gear is then "sewn" to the fuselage with thread, two small holes being bored through for this purpose with a 1/32 in. drill or a (Continued on page 54)

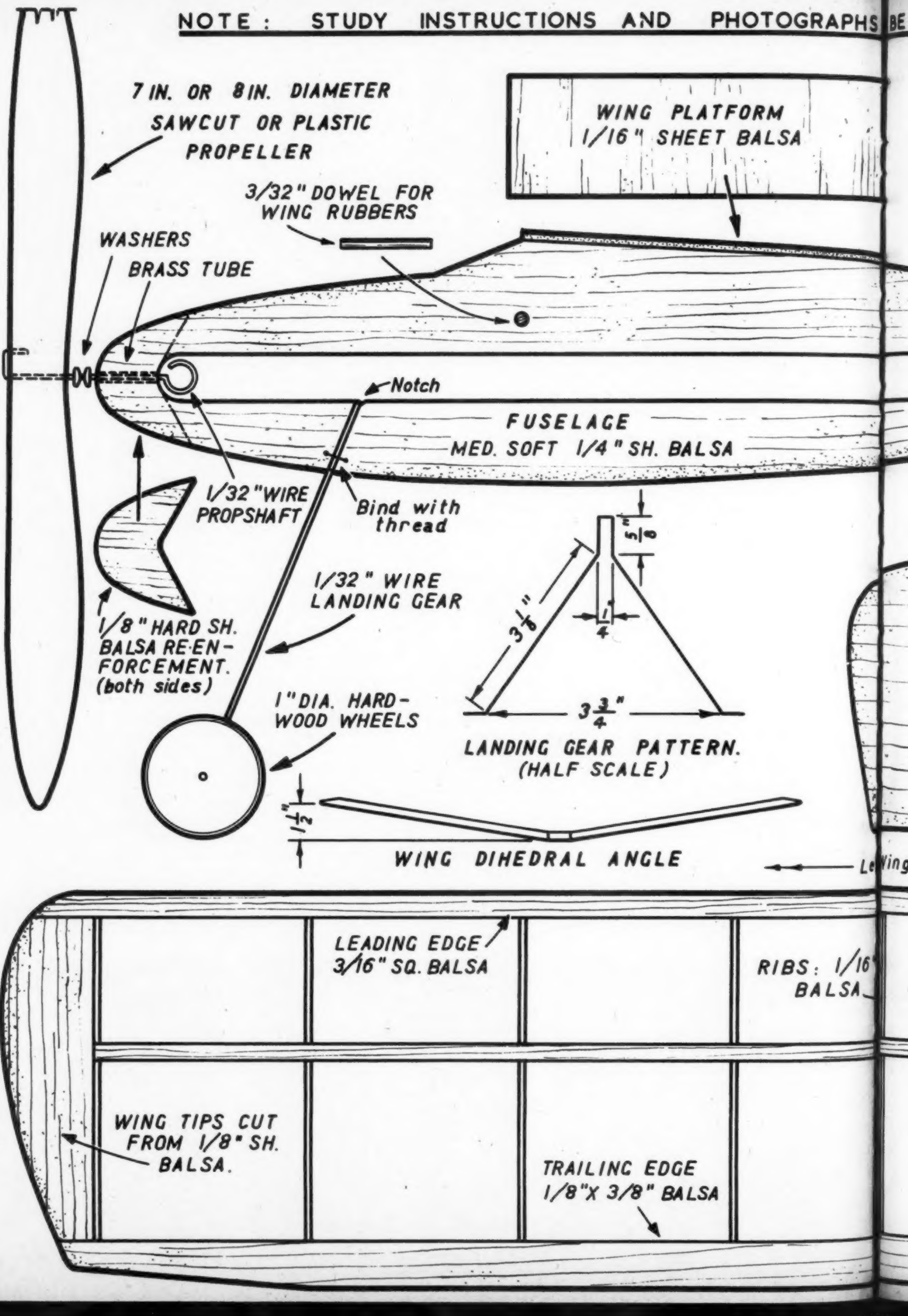
FULL SIZE PLANS ON FOLLOWING 2 PAGES

Commence covering on bottom surface by stretching tissue tip to tip. Follow the directions.

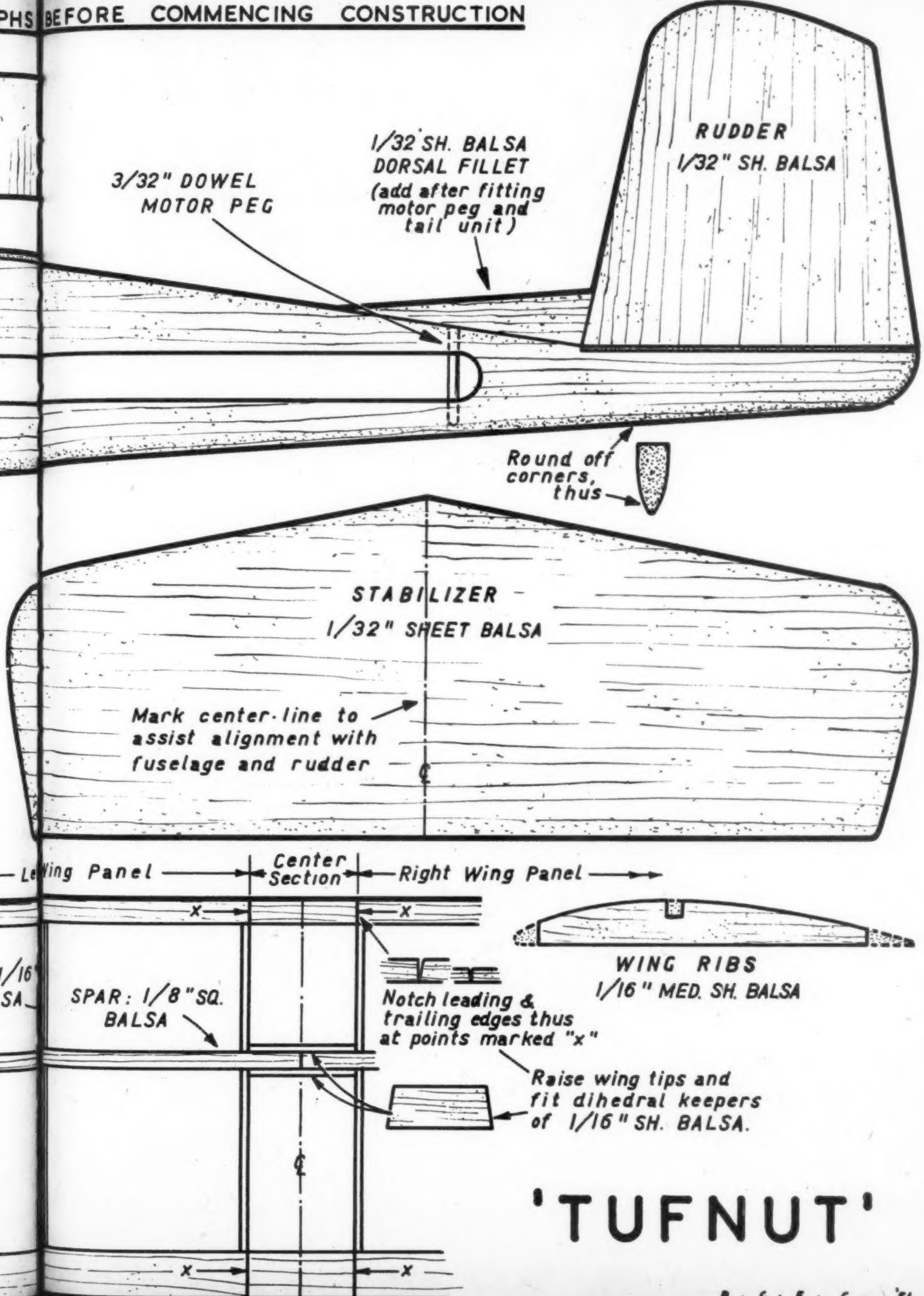
After sticking ends at one point, pull tissue across wing, as shown, and work toward the tips.



Dope underside first. Support edges on scraps 1/8 balsa, pin down, then dope the top surface.

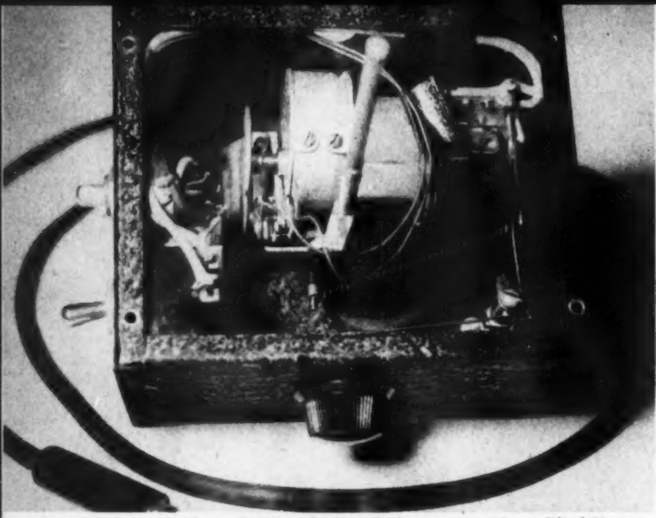


NOTE: STUDY INSTRUCTIONS AND PHOTOGRAPHS BE
7 IN. OR 8 IN. DIAMETER SAWCUT OR PLASTIC PROPELLER
WING PLATFORM 1/16" SHEET BALSA
3/32" DOWEL FOR WING RUBBERS
WASHERS
BRASS TUBE
Notch
FUSELAGE MED. SOFT 1/4" SH. BALSA
1/32" WIRE PROPSHAFT
Bind with thread
5/8"
1/4
3 1/8"
1/32" WIRE LANDING GEAR
1/8" HARD SH. BALSA RE-EN-FORCEMENT. (both sides)
1" DIA. HARD-WOOD WHEELS
3 3/4"
LANDING GEAR PATTERN. (HALF SCALE)
1 1/2"
WING DIHEDRAL ANGLE
Le
Wing
LEADING EDGE 3/16" SQ. BALSA
RIBS: 1/16" BALSA
WING TIPS CUT FROM 1/8" SH. BALSA.
TRAILING EDGE 1/8"X 3/8" BALSA



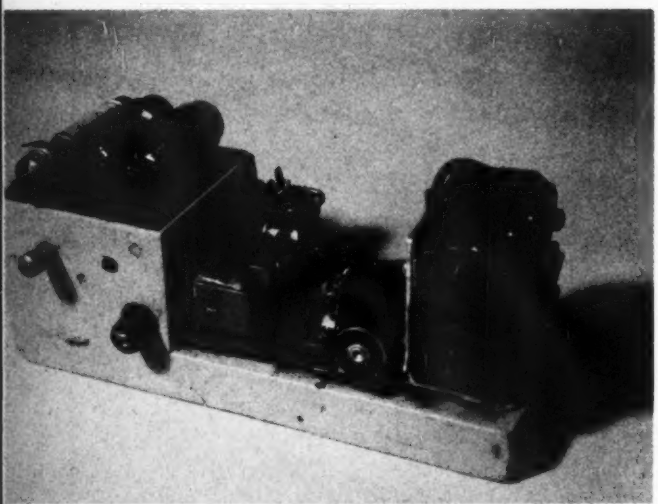

# 'TUFNUT'

P · G · F · C · '54



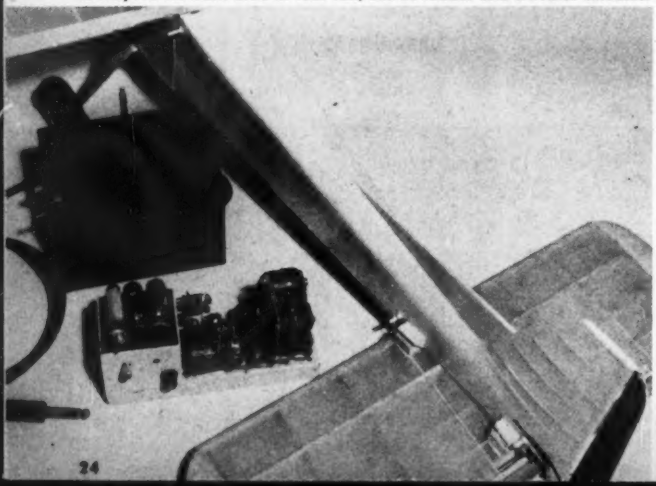
Inside control box, showing the Ray-O-Vac motor with modified Magnatorc gear box. Control coil spring and trim leaf spring adjust pulse rate.

# FOR THE RC FAN



Receiving unit with North American receiver, Neomatic relay (proportion), Sigma 4F (rate), two permanent magnet rotary actuators—16 oz. total.

Control box and receiving unit beside Bob Schade's Half-A model. Span is only 48 in. Dark area at rear tail, shows rudder and elevator surfaces.



# SIMULTANEOUS, PROPORTIONATE RUDDER & ELEVATOR CONTROL

***MAN has long pioneered the great "development" articles in the radio control field. In successful use, system gets more out of pulse than ever.***

**By DON HEWES and BOB SCHADE**

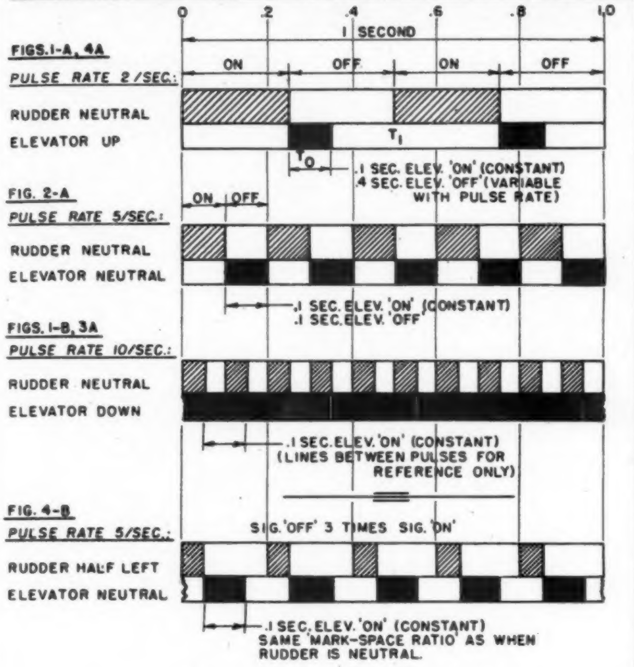
Many builders have followed the most obvious course of using a sequence type of control system to obtain a second control for their RC model while using a single transmitter frequency. Several unique systems have been evolved using modifications to the basic escapement mechanism to give different controls in sequence. There are some factors in these systems which limit their performance and reliability. One important factor is the inability to give simultaneous controls; that is, to give rudder and elevator control at the same time. Another factor on some dual controls is absence of a built-in memory. If the actuator forgets—that is, skips a signal—the flier must do the thinking and realine his control stick to get in step with the actuator. Other limitations are the relatively low speed at which some actuators must operate, the mechanical complexities and the inability to retrim the model while it is in flight.

It was to overcome these limitations that the pulse-rate system for simultaneous and proportional control operation was developed. The final system is basically a simple system comprised of a minimum number of parts (two relays, two actuators, one diode and one condenser) and does not depend on mechanical actions for the separation of the two distinct control signals. It is a flexible system in that it can be used with any type of receiver and several types of actuator. Another feature is that additional controls can be added to the dual control system without too much complexity.

The first control is based on the proportional-pulse length system which was pioneered by George Trammel and described in the MAN issues of June, 1947, and November and December, 1950, used for rudder control. The principles of this proportional pulse system are quite well known and will not be described in great detail. Essentially, they are as follows: 1. the transmitter signal "off" causes the rudder to move, let's say, to the left; 2. the signal "on" causes the rudder to move to the right; 3. keying the signal alternately "on" and "off" in equal amounts produces an effective neutral rudder signal; 4. keying slightly more "on" than "off" produces an effective proportionate right signal and, vice versa, left control; 5. any amount of left or right control between neutral and full left or right can be obtained. It should be noted that the fact that rudder going to full left on loss of signal is considered by some people to be as good a fail-safe feature as rudder going to neutral. This has been illustrated on many occasions when a ship with escapement has gone out of sight with a neutral rudder after loss of signal has been experienced, whereas a ship with "fail to left or right" has been put back in the air after spiraling in. Even if the ship is damaged, the axiom holds true that "half a ship in hand is worth a whole ship lost in the bush."

The second control or elevator control is obtained by utilizing the rate at which the signals are being pulsed. The principle of obtaining the rate control is as follows: 1. every time the transmitter is keyed "off," an impulse is generated within the rudder circuit in the model because of the collapse of the flux or magnetic field in the actuator; 2. this pulse of electrical energy is used to close a second relay which, in turn, causes 3. the second (*Continued on page* 57)

## PRINCIPLE OF DUAL PULSE-PROPORTION CONTROL




NOTE: 'MARK-SPACE RATIO' OF TRANSMITTED SIGNAL CONTROLS RUDDER

PULSE RATE CONTROLS ELEVATOR

## RECEIVER CIRCUIT

FIG. 5A TRANSMITTED SIGNAL BEING RECEIVED

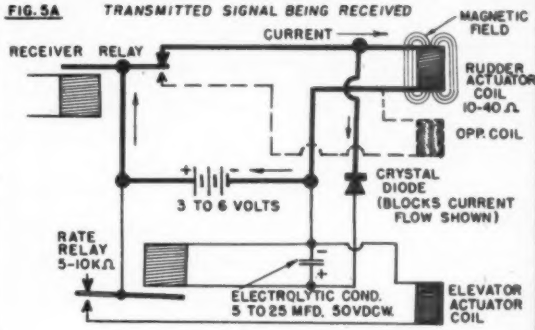
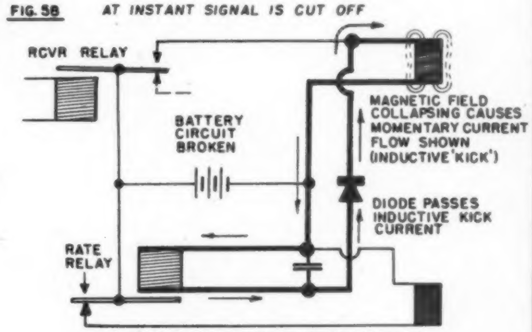
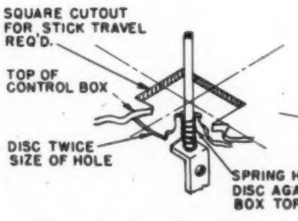



FIG. 5B AT INSTANT SIGNAL IS CUT OFF

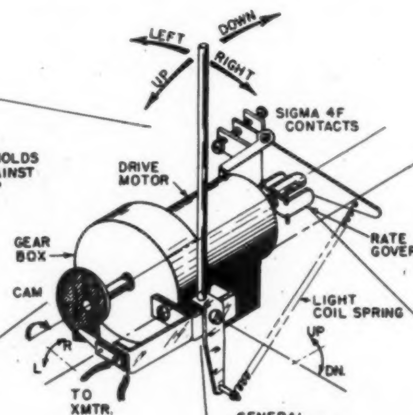



CURRENT SHOWN HERE IS MOMENTARY AND FLOWS WHEN RCVR DROPS OUT, PULLING IN THE RATE (ELEV.) RELAY.

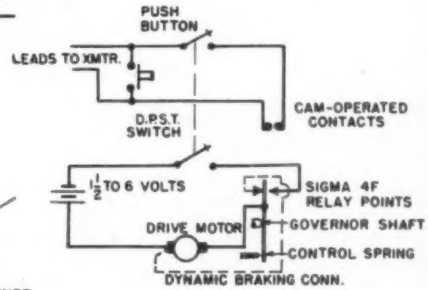
## TRANSMITTER CONTROL UNIT



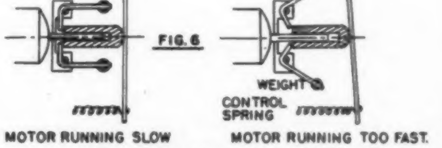

CONTROL-STICK SLIDING SEAL




GENERAL ARRANGEMENT FIG. 7

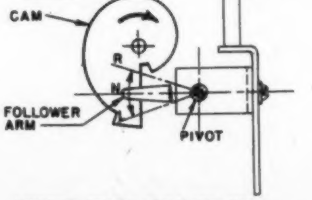



CONTROL UNIT WIRING DIAGRAM

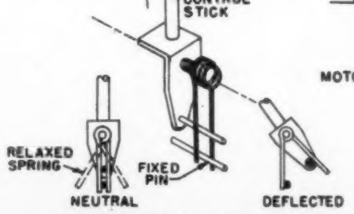



ELEVATOR RATE GOVERNOR OPERATION

FIG. 8




RUDDER PULSE CAM & FOLLOWER



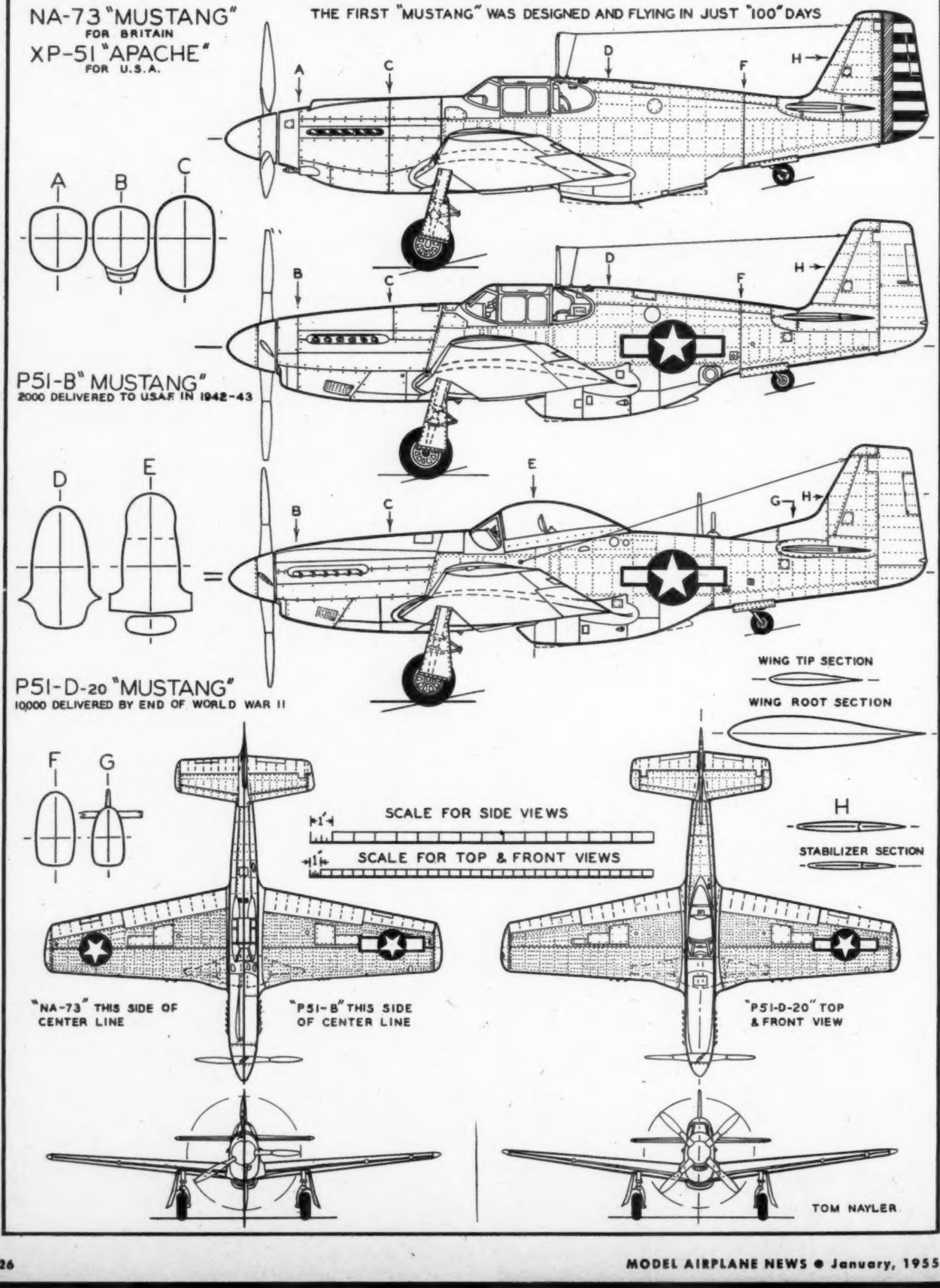

SPRING-LOADED NEUTRAL DEVICE

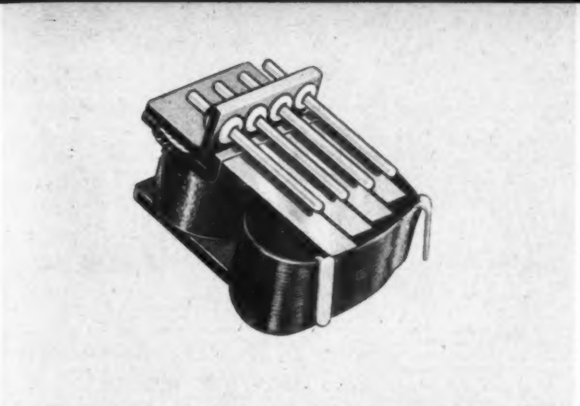
# DUAL PULSE-PROPORTIONAL CONTROL

BY: BOB SCHADE & DON HEWES

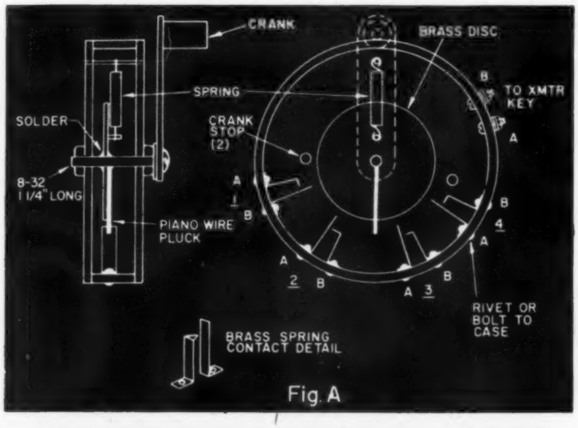
DWGS: Ed Yulke

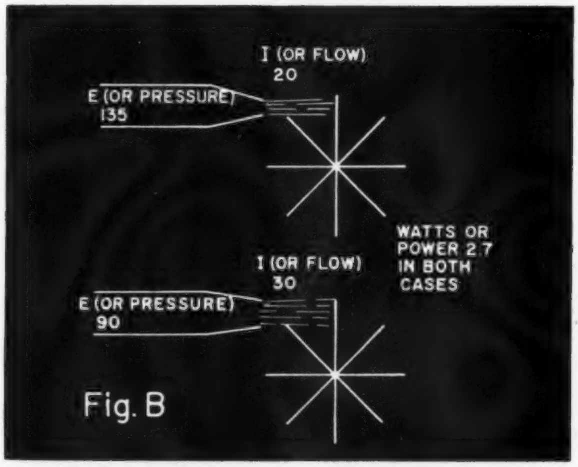
# Planes Worth Modeling—MUSTANG

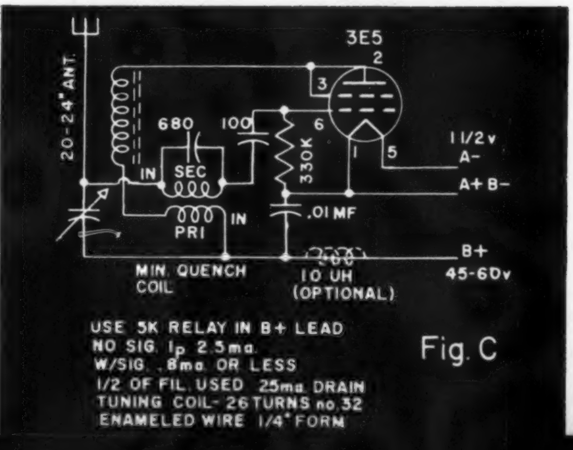




Experimenters in multi-control will be interested in Neomatic reed banks. One reed set-up costs $6.95 and the four-reed bank (shown), $11.95.



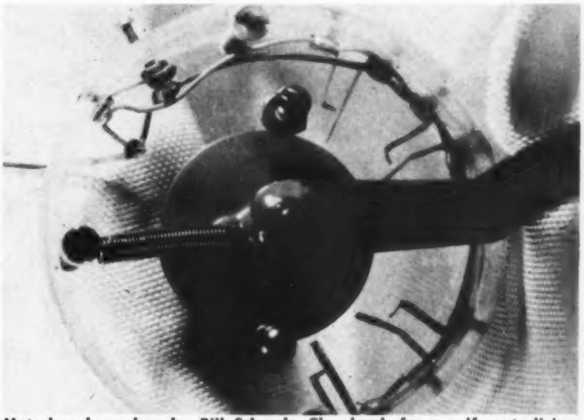




# Radio Control News

by E. J. LORENZ

***Even the most incurious flier sometimes will benefit from this painless skull session on wattage. New products, too, club news, and ideas to boot.***

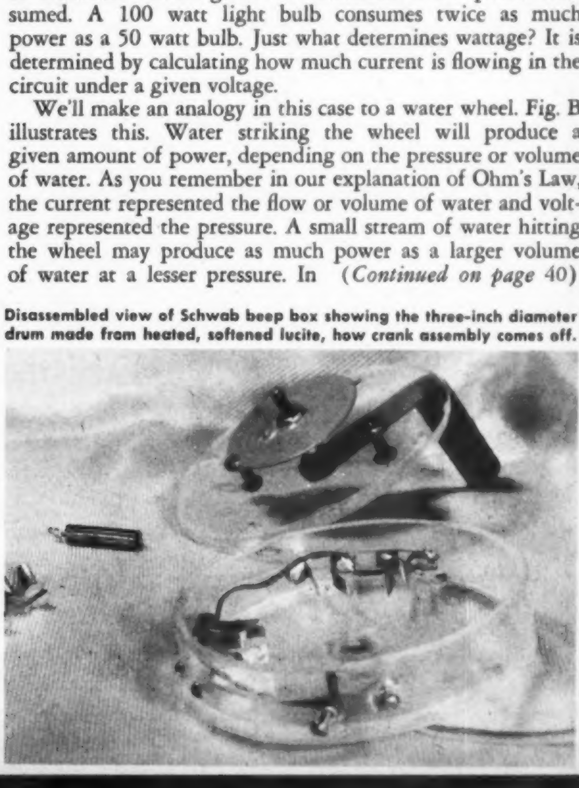


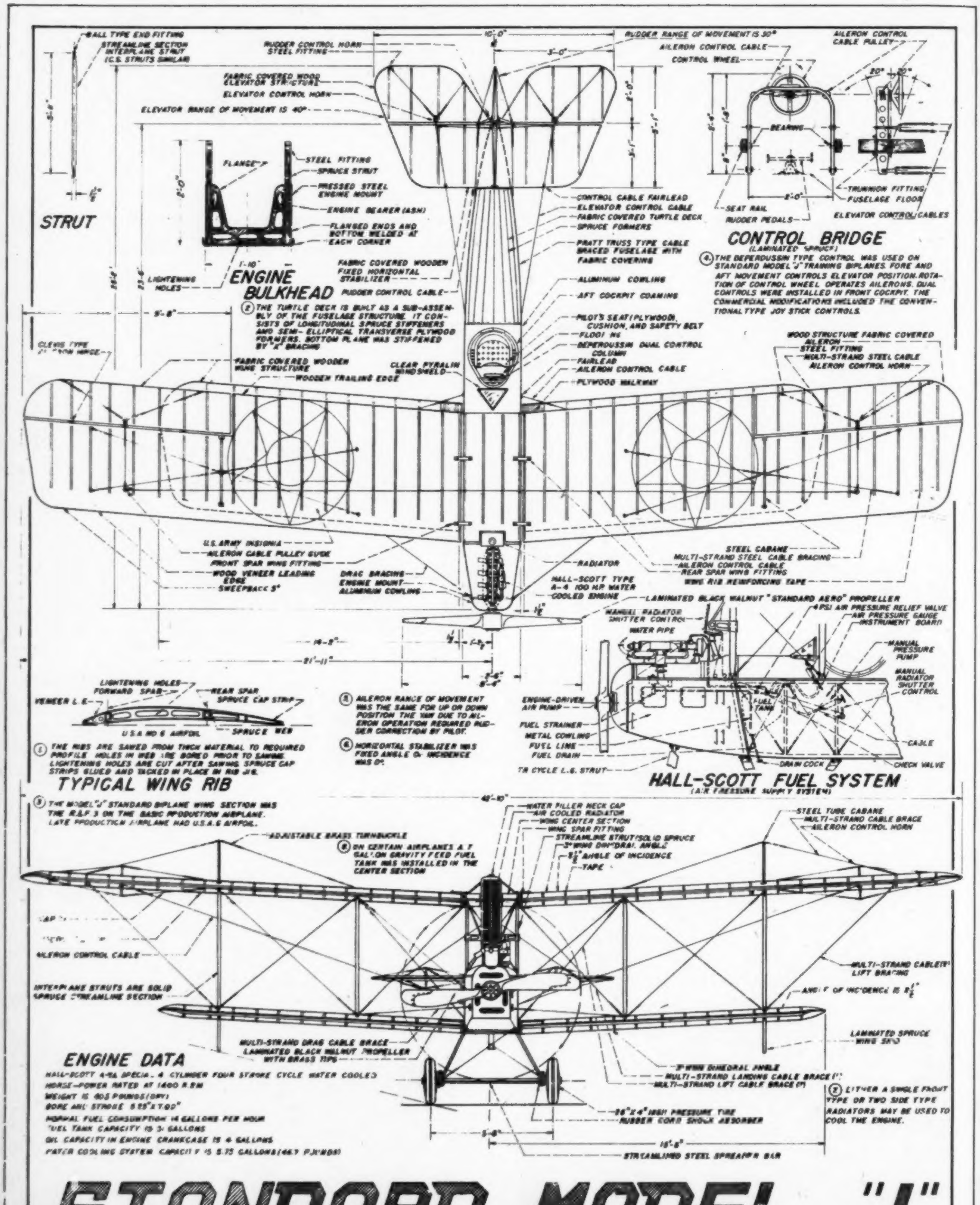
**Motorless beep box by Bill Schwab, Cleveland, for a self-neutralizing escapement, is easily made from lucite and readily obtained materials.**

In the October issue, Ohm's Law was described, dealing with voltage, current and resistance. Now we'll consider the subject of "watts" or power. The wattage of any electrical or electronic device gives an indication of the power consumed. A 100 watt light bulb consumes twice as much power as a 50 watt bulb. Just what determines wattage? It is determined by calculating how much current is flowing in the circuit under a given voltage.

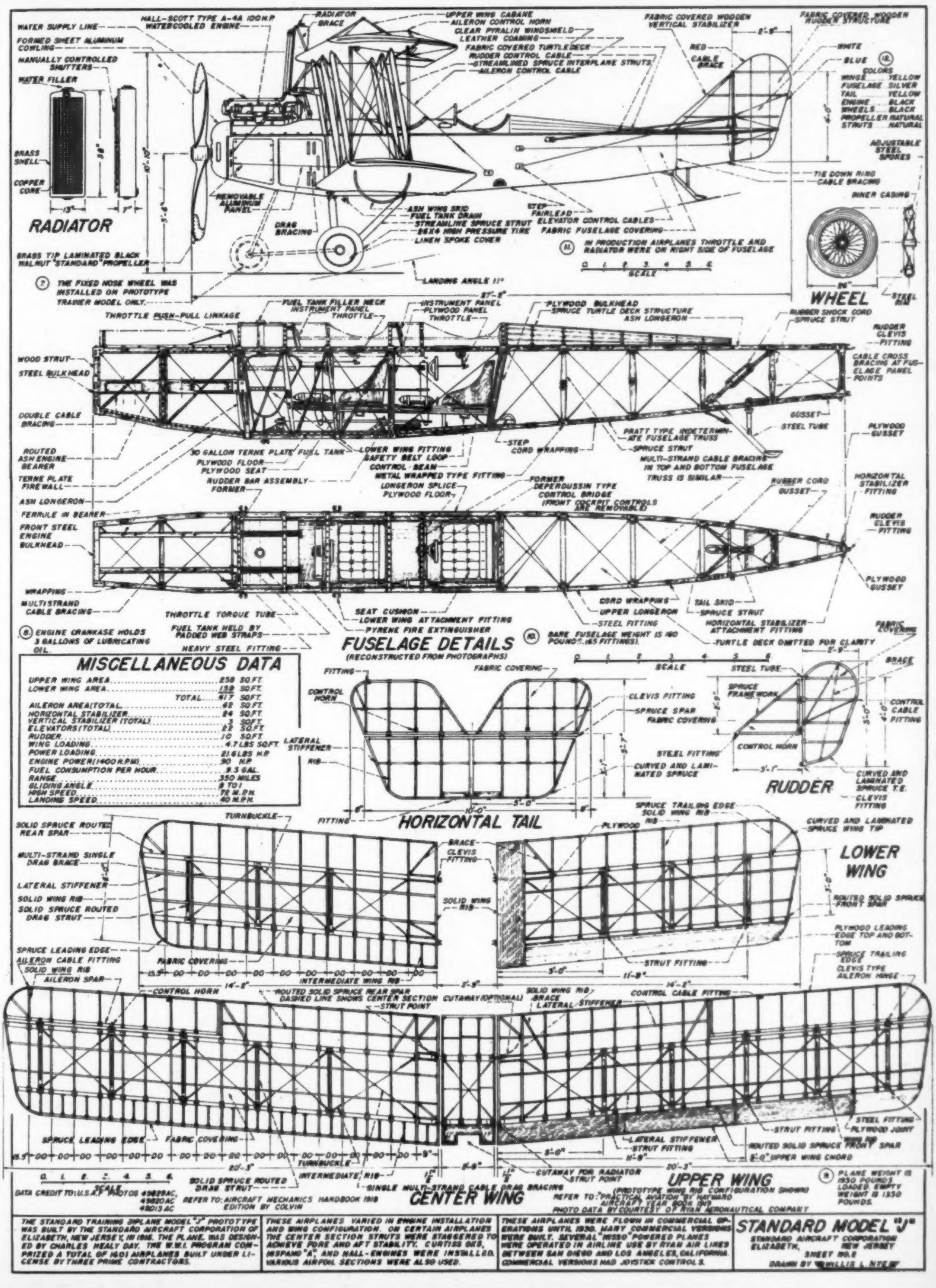
We'll make an analogy in this case to a water wheel. Fig. B illustrates this. Water striking the wheel will produce a given amount of power, depending on the pressure or volume of water. As you remember in our explanation of Ohm's Law, the current represented the flow or volume of water and voltage represented the pressure. A small stream of water hitting the wheel may produce as much power as a larger volume of water at a lesser pressure. In (*Continued on page* 40)

**Disassembled view of Schwab beep box showing the three-inch diameter drum made from heated, softened lucite, how crank assembly comes off.**





STANDARD MODEL "J"
DRAWN BY WILLIS L. NYE
SHEET NO. 1
STRUT
BALL TYPE END FITTING
STREAMLINE SECTION INTERPLANE STRUT (C.S. STRUTS SIMILAR)
ENGINE BULKHEAD
FLANGE
STEEL FITTING
SPRUCE STRUT
PRESSED STEEL ENGINE MOUNT
ENGINE BEARER (ASH)
FLANGED ENDS AND BOTTOM WELDED AT EACH CORNER
LIGHTENING HOLES
RUDDER CONTROL HORN STEEL FITTING
FABRIC COVERED WOOD ELEVATOR STRUCTURE
ELEVATOR CONTROL HORN
ELEVATOR RANGE OF MOVEMENT IS 40°
RUDDER RANGE OF MOVEMENT IS 50°
AILERON CONTROL CABLE
CONTROL WHEEL
AILERON CONTROL CABLE PULLEY
BEARING
TRUNNION FITTING
FUSELAGE FLOOR
SEAT RAIL
RUDDER PEDALS
ELEVATOR CONTROL CABLES
CONTROL BRIDGE (LAMINATED SPRUCE)
④ THE DEPERDUSSIN TYPE CONTROL WAS USED ON STANDARD MODEL "J" TRAINING BIPLANES. FORE AND AFT MOVEMENT CONTROLS ELEVATOR POSITION. ROTATION OF CONTROL WHEEL OPERATES AILERONS. DUAL CONTROLS WERE INSTALLED IN FRONT COCKPIT. THE COMMERCIAL MODIFICATIONS INCLUDED THE CONVENTIONAL TYPE JOY STICK CONTROLS.
CONTROL CABLE FAIRLEAD
ELEVATOR CONTROL CABLE
FABRIC COVERED TURTLE DECK
SPRUCE FORMERS
PRATT TRUSS TYPE CABLE BRACED FUSELAGE WITH FABRIC COVERING
FABRIC COVERED WOODEN FIXED HORIZONTAL STABILIZER
RUDDER CONTROL CABLE
ALUMINUM COWLING
AFT COCKPIT COAMING
② THE TURTLE DECK IS BUILT AS A SUB-ASSEMBLY OF THE FUSELAGE STRUCTURE. IT CONSISTS OF LONGITUDINAL SPRUCE STIFFENERS AND SEMI-ELLIPTICAL TRANSVERSE PLYWOOD FORMERS. BOTTOM PLANE WAS STIFFENED BY "X" BRACING
PILOT'S SEAT (PLYWOOD) CUSHION, AND SAFETY BELT
FLOORING
DEPERDUSSIN DUAL CONTROL COLUMN
FAIRLEAD
AILERON CONTROL CABLE
PLYWOOD WALKWAY
CLEVIS TYPE AILERON HINGE
FABRIC COVERED WOODEN WING STRUCTURE
WOODEN TRAILING EDGE
CLEAR PYRALIN WINDSHIELD
WOOD STRUCTURE FABRIC COVERED AILERON
STEEL FITTING
MULTI-STRAND STEEL CABLE
AILERON CONTROL HORN
U.S. ARMY INSIGNIA
AILERON CABLE PULLEY GUIDE
FRONT SPAR WING FITTING
WOOD VENEER LEADING EDGE
SWEEPBACK 3°
DRAG BRACING
ENGINE MOUNT
ALUMINUM COWLING
RADIATOR
HALL-SCOTT TYPE A-4 100 H.P. WATER COOLED ENGINE
STEEL CABANE
MULTI-STRAND STEEL CABLE BRACING
AILERON CONTROL CABLE
REAR SPAR WING FITTING
WING RIB REINFORCING TAPE
LIGHTENING HOLES
FORWARD SPAR
REAR SPAR
SPRUCE CAP STRIP
VENEER L.E.
U.S.A. NO. 6 AIRFOIL
SPRUCE WEB
① THE RIBS ARE SAWED FROM THICK MATERIAL TO REQUIRED PROFILE. HOLES IN WEB ARE BORED PRIOR TO SAWING. LIGHTENING HOLES ARE CUT AFTER SAWING. SPRUCE CAP STRIPS GLUED AND TACKED IN PLACE IN RIB JIG.
TYPICAL WING RIB
③ THE MODEL "J" STANDARD BIPLANE WING SECTION WAS THE R.A.F. 3 ON THE BASIC PRODUCTION AIRPLANE. LATE PRODUCTION AIRPLANE HAD U.S.A. 6 AIRFOIL.
⑤ AILERON RANGE OF MOVEMENT WAS THE SAME FOR UP OR DOWN POSITION. THE YAW DUE TO AILERON OPERATION REQUIRED RUDDER CORRECTION BY PILOT.
⑥ HORIZONTAL STABILIZER WAS FIXED ANGLE OF INCIDENCE WAS 0°.
LAMINATED BLACK WALNUT "STANDARD AERO" PROPELLER
4 PSI AIR PRESSURE RELIEF VALVE
AIR PRESSURE GAUGE
INSTRUMENT BOARD
MANUAL RADIATOR SHUTTER CONTROL
WATER PIPE
MANUAL PRESSURE PUMP
MANUAL RADIATOR SHUTTER CONTROL
ENGINE-DRIVEN AIR PUMP
FUEL STRAINER
METAL COWLING
FUEL LINE
FUEL DRAIN
TRICYCLE L.G. STRUT
FUEL TANK
DRAIN COCK
CABLE
CHECK VALVE
HALL-SCOTT FUEL SYSTEM (AIR PRESSURE SUPPLY SYSTEM)
WATER FILLER NECK CAP
AIR COOLED RADIATOR
WING CENTER SECTION
WING SPAR FITTING
STREAMLINE STRUT (SOLID SPRUCE)
3° WING DIHEDRAL ANGLE
2½° ANGLE OF INCIDENCE
TAPE
STEEL TUBE CABANE
MULTI-STRAND CABLE BRACE
AILERON CONTROL HORN
ADJUSTABLE BRASS TURNBUCKLE
⑧ ON CERTAIN AIRPLANES A 7 GALLON GRAVITY FEED FUEL TANK WAS INSTALLED IN THE CENTER SECTION
AILERON CONTROL CABLE
INTERPLANE STRUTS ARE SOLID SPRUCE STREAMLINE SECTION
MULTI-STRAND CABLE LIFT BRACING
ANGLE OF INCIDENCE IS 2½°
LAMINATED SPRUCE WING SKID
MULTI-STRAND DRAG CABLE BRACE
LAMINATED BLACK WALNUT PROPELLER WITH BRASS TIPS
3° WING DIHEDRAL ANGLE
MULTI-STRAND LANDING CABLE BRACE
MULTI-STRAND LIFT CABLE BRACE
⑦ EITHER A SINGLE FRONT TYPE OR TWO SIDE TYPE RADIATORS MAY BE USED TO COOL THE ENGINE.
26" X 4" HIGH PRESSURE TIRE
RUBBER CORD SHOCK ABSORBER
STREAMLINED STEEL SPREADER BAR
ENGINE DATA
HALL-SCOTT A-4A SPECIAL 4 CYLINDER FOUR STROKE CYCLE WATER COOLED
HORSE-POWER RATED AT 1400 R.P.M.
WEIGHT IS 405 POUNDS (DRY)
BORE AND STROKE 5.25" X 7.00"
NORMAL FUEL CONSUMPTION 14 GALLONS PER HOUR
FUEL TANK CAPACITY IS 3- GALLONS
OIL CAPACITY IN ENGINE CRANKCASE IS 4 GALLONS
WATER COOLING SYSTEM CAPACITY IS 5.75 GALLONS (46.7 POUNDS)
10'-0"
5'-0"
21'-11"
14'-2"
42'-10"
15'-6"
5'-6"
5'-8"




## MISCELLANEOUS DATA

| | |
|---|---|
| UPPER WING AREA | 258 SQ.FT. |
| LOWER WING AREA | 159 SQ.FT. |
| TOTAL | 417 SQ.FT. |
| AILERON AREA (TOTAL) | 42 SQ.FT. |
| HORIZONTAL STABILIZER | 24 SQ.FT. |
| VERTICAL STABILIZER (TOTAL) | 3 SQ.FT. |
| ELEVATORS (TOTAL) | 22 SQ.FT. |
| RUDDER | 10 SQ.FT. |
| WING LOADING | 4.7 LBS SQ.FT. |
| POWER LOADING | 21.6 LBS H.P. |
| ENGINE POWER (1400 R.P.M.) | 90 H.P. |
| FUEL CONSUMPTION PER HOUR | 9.5 GAL. |
| RANGE | 350 MILES |
| GLIDING ANGLE | 8 TO 1 |
| HIGH SPEED | 72 M.P.H. |
| LANDING SPEED | 40 M.P.H. |

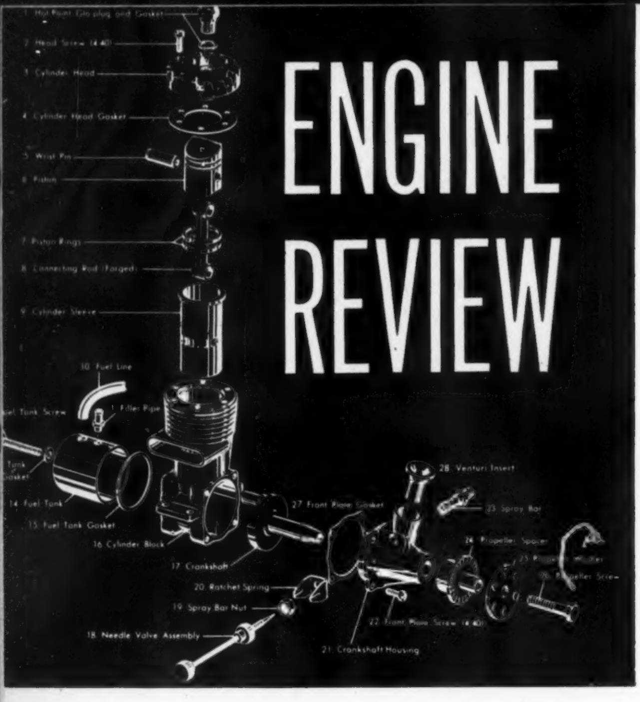
THE STANDARD TRAINING BIPLANE MODEL "J" PROTOTYPE WAS BUILT BY THE STANDARD AIRCRAFT CORPORATION OF ELIZABETH, NEW JERSEY, IN 1916. THE PLANE WAS DESIGNED BY CHARLES HEALY DAY. THE W.W.I. PROGRAM COMPRIZED A TOTAL OF 1601 AIRPLANES BUILT UNDER LICENSE BY THREE PRIME CONTRACTORS.

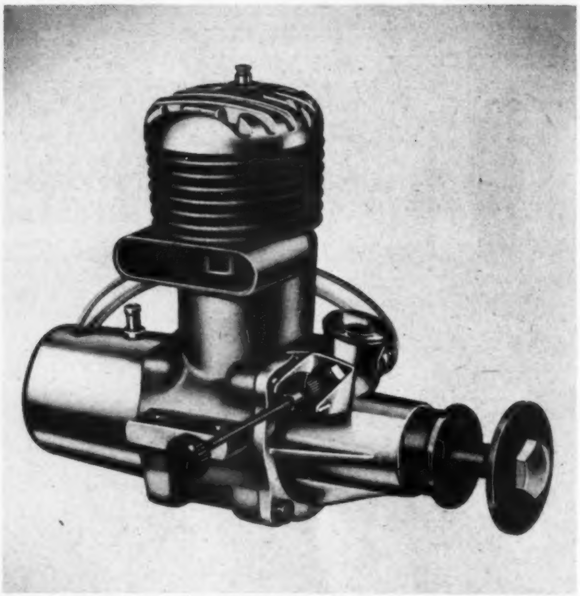
THESE AIRPLANES VARIED IN ENGINE INSTALLATION AND WING CONFIGURATION. ON CERTAIN AIRPLANES THE CENTER SECTION STRUTS WERE STAGGERED TO ACHIEVE FORE AND AFT STABILITY. CURTISS OX5, HISPANO "A", AND HALL-ENGINES WERE INSTALLED. VARIOUS AIRFOIL SECTIONS WERE ALSO USED.

THESE AIRPLANES WERE FLOWN IN COMMERCIAL OPERATIONS UNTIL 1930. MANY COMMERCIAL VERSIONS WERE BUILT. SEVERAL "HISSO" POWERED PLANES WERE OPERATED IN AIRLINE USE BY RYAN AIR LINES BETWEEN SAN DIEGO AND LOS ANGELES, CALIFORNIA. COMMERCIAL VERSIONS HAD JOYSTICK CONTROLS.

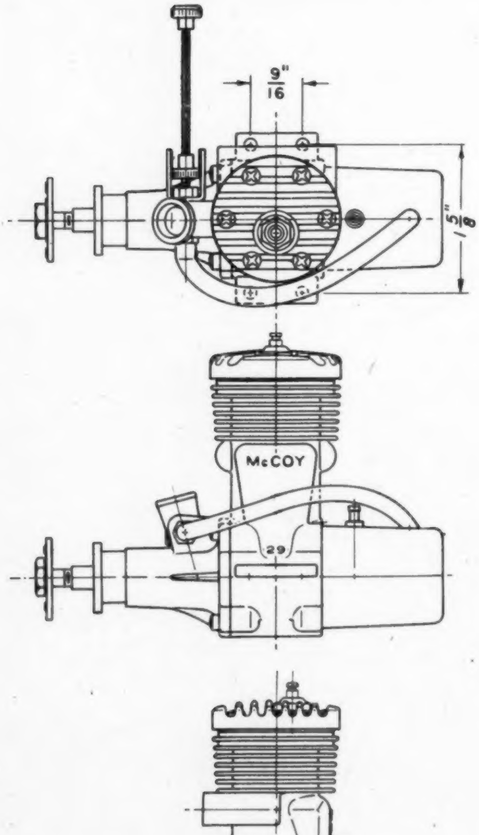
**STANDARD MODEL "J"**
STANDARD AIRCRAFT CORPORATION
ELIZABETH, NEW JERSEY
SHEET NO. 2
DRAWN BY WILLIS L. NYE

# ENGINE REVIEW



Greatly resembling the older Sport .29, the new job is possessed of an exceptional ability to draw fuel, an important point in the stunt field.




## By E. C. MARTIN

***This newest "Mac" is more than just another shaft valve engine. For sport or stunt, it nevertheless nearly equals the Red Head for high performance.***

▶ A new McCoy always creates a stir. The speed fans dissect it for parts which can be profitably adapted to the Red Heads. Performance rumors radiate to the four corners of the earth, and in foreign countries the man with inside dope commands respectful attention. We have seen it happen, and it will happen again, with the .29 Front Rotor Sport for the very good reason that it is good. Previous McCoy sport engines have apparently been aimed at the low priced field, and their general quality has not been comparable with that of the famous Red Heads, but this new offering, although reasonably priced, is of Red Head standard throughout in workmanship, quality and finish, and in the performance department it comes perilously close to the .29 Red Head and without a single ball bearing. Added to this it has the important virtue of flexibility with powerful suction to put it in direct competition with the best stunt engines available. McCoy performance with stunt characteristics is news.

Perhaps more than any other line, the Macs have a very pronounced family resemblance, and to many this engine will appear just like the older front rotor jobs, and they may be inclined to dismiss it as such. The body style may be the same, but let us peek under the hood. The body is right; it doesn't need changing.

Pressure die-cast Macs are not new, nor is the word "rigidity" to this column. Here we have an aluminum pressure casting with a grey etched finish that is 30 per cent thicker and stronger at all points of stress and is not only more rigid, but able to dissipate considerably greater quantities of heat. A shiny finish often looks nice, but a dull surface has far more radiation capacity. In addition to increasing the root diameter of the top two fins to accommodate the head retaining screws, the space between the second and third fins has cast-in lugs in the appropriate radial position to provide for longer tappings and reduce the possibility of stripped threads and consequent compression loss. However, it is unfortunate that the screws fitted are not (*Continued on page 31*)

long enough to take advantage of this improvement.

The bypass is slightly narrower at the ports than the older Sportsman, but appreciably wider at its junction with the crankcase, and is no doubt aimed at improving or maintaining rapid gas flow with less bypass volume so that crankcase compression pressure is increased. From the operator's point of view, this also improves starting and pick-up from low running speeds under load.

The exhaust stack is dimensionally identical with the older die-cast models except for being slightly broader round the ports, giving an easier exit to the gases emerging from the ports at either side.

A shrunk in liner is used in common with all ringed McCoys, and is interchangeable with the .29 Red Head.

Since only the front bearing housing is removable on this model, it has been necessary, in the absence of a disc valve, to blank off the crankcase at a point just clear of the crankpin. This has the appearance of a plug, but is actually part of the casting and is recessed at the back for lightness. The recess is stepped to provide location for a paper tank joint gasket and also for the rim of the tank itself. A long boss projects back from the center of the recess which is tapped for the tank retaining screw. A small but significant point is that the gasket recess diameter is identical with the crankcase internal diameter, which in turn is the same as that of all the Mac .29 engines, which means that a simple boring operation will make this crankcase suitable for Red Head equipment. However, the most exciting feature of all to those with an experimental turn of mind is the fact that with very little work this casting should lend itself to a terrific reed valve arrangement. In fact, it seems such a gift that perhaps the designer had it in mind, though this suggestion is based on pure speculation.

All mating faces are machined on this casting and sturdy mounting lugs of 3/16 root thickness complete a very good job.

The front bearing housing is a tumbled pressure casting incorporating the air intake and a press fitted bronze bushing of 7/16 bore x 1-1/4 long which adds up to a bearing area considered generous in an engine of 50 per cent greater displacement. At the crank end the bushing is heavily chamfered to reduce the thrust face to a narrow edge and allow rapid mating with the shaft during break-in. This edge is nicked in three places by small oilways.

It may seem odd that a large bearing area reduces friction and increases performance when dealing with radial loads, when the reverse seems to hold true for thrust loads, but there is no doubt that such is the case and improvements in the thrust bearing often pay better than extensive radial bearing modifications. Older modelers will remember the superiority in their day of the plain bushed engines that boasted small ball thrust bearings, and it seems very probable that a large proportion of the advantage gained by using ball journal bearings in a racing engine arises from their secondary function of absorbing thrust.

The housing itself is rendered extremely rigid by three heavy webs which also serve to cool the bearing, and the location of the intake gives a full 7/16 of bushing length between the thrust face and intake port. The intake itself is 1/4 in. bore compared with 7/32 for the early model Red Heads and the engine is supplied with a removable restrictor to bring the bore down to this diameter for break-in and applications demanding extra suction. A feature of this restrictor is that it changes the whole nature of the intake by filling the typical high speed trumpet entry so that a fairly long parallel bore results with good low speed characteristics.

The jet assembly is the spraybar type as fitted to the early McCoy. 19, but is equipped with a flexible needle extension 1-3/4 long, with ratchet wheel, which is interchangeable in most of the ringed McCoys. By tapping the intake holes No. 10-32, the spraybar can be replaced with Red Head equipment for straight speed.

Case hardened and ground to a very smooth finish, the crankshaft exhibits high quality throughout. With a full disc and crescent counterweight it resembles the other models except for the crankpin which is surface finished before hardening, and is likely to have even better wear characteristics. The 7/16 shaft terminates in a shallow and dead concentric locking taper and is tapped for a No. 10-32 prop retaining bolt. A 5/16 gas passage leads from the large rectangular valve port which is timed for early opening and closing.

The prop driver is a muff type of 3/4 outside diameter with a 1/4 x 1/4 projection for prop location and a lightly knurled face. A 15/16 steel washer and hex head bolt provide clamping for props between 7/16 and 5/8 hub thickness.

A standard polished .29 Red Head conrod is used which couples up to a new type of wrist pin having no aluminum end pads, and apparently made from Meehanite, or similar material, which will not score the bore.

The piston is also standard Red Head .29, pressure die-cast, diamond-turned and equipped with two rings. The cylinder head is a polished pressure casting in aluminum of general design similar to the Red Head and takes a long reach plug.

A further aluminum die casting constitutes the large capacity fuel tank, which may be rotated for side or inverted mounting, and is one of the few rear-mounted types which does not cave in when the screw is tightened too energetically. A filling tube nipple is provided and drilled holes serve as vent and fuel line connection.

In appearance and quality this is one of the most attractive McCoys produced so far. However, the most significant feature is its performance. This is a McCoy calculated to please the largest number of people, not just the pure speed fan, or the youngster wanting lots of urge for the least money, but the average fellow who likes a powerful, flexible and startable engine that does not get temperamental when the juice gets splashed about in the tank, and that will perk smoothly on a wide variety of prop sizes. This Mac has all these qualities plus the well known long wearing virtue of a good ringed engine.

**TEST: McCoy .29 Front Rotor Sports**

Plug: McCoy Hot Point 1/4-32 Long Reach, 1-1/2 volts to start; Fuel: Supersonic 1000; Running Time Prior to Test: two hours; Bore: .750; Stroke: .670; Weight: 7-1/2 oz.

| *Power Prop* | *RPM* |
|---|---|
| 10 x 8 | 11,400 |
| 10 x 6 | 12,250 |
| 9 x 8 | 12,500 |
| 9 x 6 | 13,600 |
| 8 x 8 | 14,000 |
| 8 x 6 | 14,800 |
| 7 x 10-1/2 | 13,700 |
| 7 x 9 | 14,500 |
| 7 x 8 | 15,300 |
| *Top Flite* | *RPM* |
| 10 x 8 | 10,200 |
| 10 x 6 | 11,400 |
| 9 x 8 | 11,500 |
| 9 x 6 | 12,700 |
| 8 x 8 | 13,000 |
| 8 x 6 | 13,900 |

*Note: These are maximum performance figures with restrictor removed.* *END*

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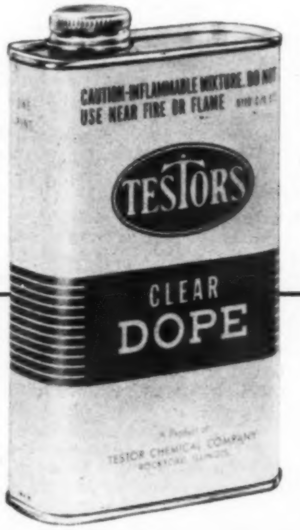


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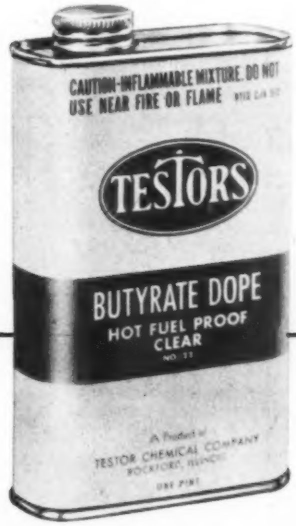


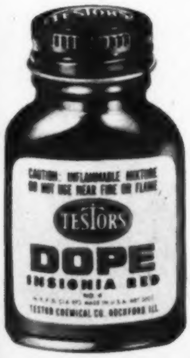



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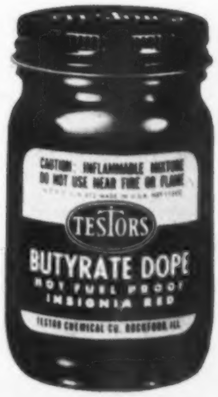


P. G. F. CHINN

# FOREIGN NOTES

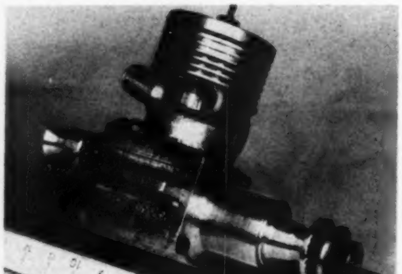
***A monthly world-wide round-up of technical developments, designs, significant industrial products.***

## by P. G. F. CHINN

**English Channel Crossing at Last**

Talk of taking a radio controlled model plane across the stretch of water that separates England and France has been rife for the past five or six years. We have known for a long time, of course, that a flight of 22 miles (the distance from Dover to Calais) or so would present no exceptional problems as far as the model, engine and radio gear were concerned. The real difficulty lay in the means of controlling it during the Channel flight and of transferring control from and to the shore before and after the crossing. It was apparent that, unless the aspirants were prepared to wait days or weeks for the ideal combination of weather conditions, the equipment would call, first and foremost, for a pretty fast escort vessel and a big one, too, because it might have to maintain about 35 knots in a choppy sea. But $40,000 express cruisers are not easy to borrow.

The only other way was to use a light aircraft and this was, in fact, the method employed for the recent successful attempt by George Honnest-Redlich, well known British RC man and designer of ED equipment.

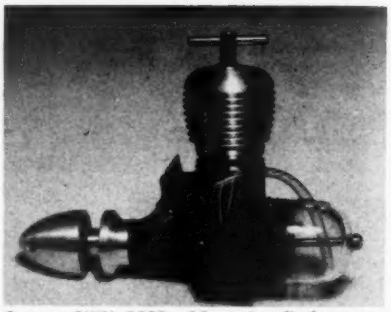


**Made in small numbers by Josef Sladky, Czechoslavian Letmo .29 bears resemblance to Dooling.**

Sponsored by the London Daily Express newspaper, Redlich, aboard an Auster, took over control of the model from a ground transmitter and successfully guided it to the French airfield that was its objective. Wind caused the model to overshoot the field (disappointing the reception party that awaited it) and was lost for several days, marring an otherwise fine performance.

**Enter the Rocking Wing**

The Wakefield model looks as though it will add yet another contrivance to its present complement of mechanical gadgets (folding props, retractable landing gears, etc.), if Australian expert Jim Fullarton's latest idea gains popularity. This device is the Rocking Wing Mount. It is designed to counteract the rearward center of gravity shift which occurs when the prop blades fold for the glide. As rubber specialists know, unless some sort of automatic compensatory control is fitted to a folding-prop job, the CG is too far forward during the power flight and a certain amount of altitude is then lost, especially at the end of the power run.



**German BWM 250D, .15 cu. in. displacement Diesel, in matt black, aluminum, a recent import.**

Jim Fullarton's method of dealing with this has been to parasol-mount the wing on two pairs of swinging struts. These struts are parallel and of equal length so that the wing movement is always parallel to the datum line. The action is similar to that of a navigator's parallel rule. Thus, no upsetting change in angle of attack can occur. A rubber band is used to pull the wing back and the forward (climbing) position is held by a thread coupled to a trigger device on the noseblock which is tripped when the rubber tensioner operates.

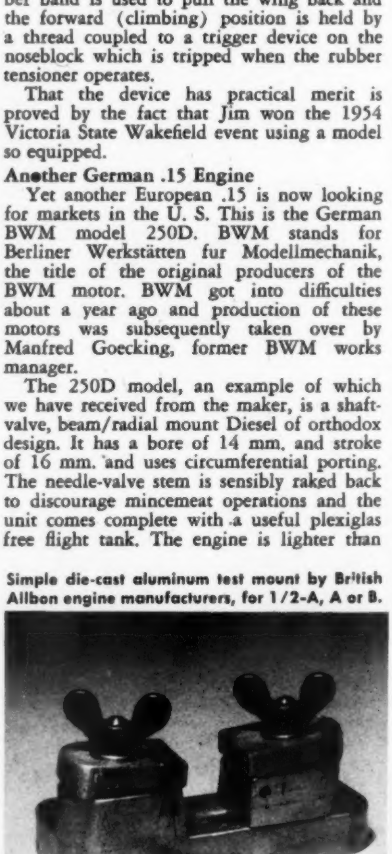
That the device has practical merit is proved by the fact that Jim won the 1954 Victoria State Wakefield event using a model so equipped.

**Another German .15 Engine**

Yet another European .15 is now looking for markets in the U. S. This is the German BWM model 250D. BWM stands for Berliner Werkstätten fur Modellmechanik, the title of the original producers of the BWM motor. BWM got into difficulties about a year ago and production of these motors was subsequently taken over by Manfred Goecking, former BWM works manager.

The 250D model, an example of which we have received from the maker, is a shaft-valve, beam/radial mount Diesel of orthodox design. It has a bore of 14 mm. and stroke of 16 mm. and uses circumferential porting. The needle-valve stem is sensibly raked back to discourage mincemeat operations and the unit comes complete with a useful plexiglas free flight tank. The engine is lighter than

**Simple die-cast aluminum test mount by British Allbon engine manufacturers, for 1/2-A, A or B.**



most European's .15's which should be a help to some export users. Our only complaint is with the "English" leaflet supplied.

### First British Reed-Valve Motor

A new and interesting reed-valve motor has just been put on the market by Aerol Engineering of Liverpool, England, makers of the well known Elfin range. It is the first British reed-valve production motor and the only quantity produced reed-valve Diesel at the time of writing. The motor is not an adaptation of any existing model: it is an entirely new design and shows several interesting departures from orthodox practice. Unusual appearance is also contributed by an immensely rigid barrel type crankcase which is cylindrical in shape and encloses two ball bearings. The mounting lugs are located centrally on this, reducing overhang to a minimum. It must be virtually impossible to break the lugs off this motor.

The cylinder is of a screw-in type with annular porting but differs from previous Elfin practice. There is a considerable overlap of exhaust and bypass porting. The alloy finned head and cylinder barrel are unique. The finned portion is separate and slides over the liner. Only the upper part of the liner, surrounding the contrapiston, is threaded and a separate cap, recessed into the head finning, screws on to this to lock the assembly. The reed unit is contained in a deeply recessed backplate which screws into the crankcase. A single reed is used and its rim is held in place by a compression spring locked by a circlip. The separate carburetor screws into the center of the backplate and carries a conventional spraybar needle-valve assembly.

The first Elfin motor appeared six years ago and was the forerunner of the modern lightweight contest Diesel. It remains to be seen whether the new model will have a similar impact on British Diesel design.

### Czech Letmo Racing .29

There are no quantity produced engines in Czechoslovakia but, for many years, the name of Letmo has, on the continent of Europe, been synonymous with high performance motors. We briefly mentioned the existence of the Letmo .29 cu. in. racing motor in our June, 1954 column. The motor is of the usual disc valve, twin ball bearing layout. Notable features are its ultra-lightweight slipper type, two-ring piston, which has very large square skirt ports registering with similar ports in the lower cylinder wall, and its molded rotor disc which has the edges of the intake aperture chamfered off.

### Fiberglas for Peaceful Home Life

If you have taken to using Fiberglas for model parts, you may also have had to contend with some pointed remarks—if not drastic action—from other members of the family, for most people seem to find the penetrating odor of polyester resins even more unwelcome than dope and cement.

One way to keep the peace, therefore, is to show how useful Fiberglas and resins can prove for household and other non-modeling items. Unbreakable pots and containers for outdoor use are easy; so is the repair of crockery and furniture. From Queensland, Peter Weaver, well known Australian RC man and firm believer in Fiberglas, writes, ". . . Recently, I proved its worth in no uncertain way. I have an old Adams shotgun that I was very attached to. It was a hammer gun but it just suited me until the stock broke just behind the hammers. It was a clean break, so, the other day, I unearthed it and bonded some Fiberglas between the broken halves, then wrapped one layer of .0025 f.g. around the break. Result: two weeks' shooting so far and the gun as good as ever. Now I am bonding some runners on a big game fishing rod in preparation for some shark fishing."

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## FACTS About Flying Boats

(*Continued from page* 13)

angles of both hull and wing are constantly changing and unless the amplitude occurs around the best trim angle and is low, the model may never take off. To go into the causes and cures of porpoising is beyond the scope of this article, but the underwater shape of the hull has much to do with it.

During late 1951 and early 1952 the author hopefully designed and constructed a model flying boat based on the NACA developed planing tail hull formula (Fig. 2). This model as first built weighed 17 oz. and was powered by an Arden .099 motor. It proved very successful. Within a few feet the hull was planing smoothly on the forebody only, with the afterbody clear of the water. Under dead calm conditions it took off consistently in less than 15 ft. with no indication of porpoising.

During the summer of 1953 further tests were conducted leading toward development of a radio controlled boat. By use of weights massed around the CG, the gross weight was increased to 34 oz. The take-off run was longer, true, but after some adjustments, the model got off smoothly and climbed, still equipped with the reliable old Arden .099.

While this is certainly not a PAA Load carrying record, it highlights the efficiency of the planing tail hull. For comparative purposes the wing loading of this model at this 100 per cent overload was 15 oz. per square foot; beam loading was 8.5 oz. per inch of beam, and the power loading was 343 oz. per cubic inch of cylinder displacement. These are quite respectable figures even for radio control.

Let's examine the reasons for this model's success. Firstly, the planing tail hull has a very low resistance, particularly at the hump (Fig. 3) so that the model commenced planing on the step promptly. Secondly, as originally designed, the model had a moderate beam loading of 4 oz. per inch of beam and a wing loading of 7.75 oz. per square foot of wing area. Thirdly, the planing surfaces were flat except near the bow, which, in addition to planing efficiently, simplified construction considerably compared with a Vee bottom. Fourthly, the planing tail hull is stable all during the take-off run and does not porpoise. Resistance beyond the hump is low and this hull very fortunately planes at a "free to trim" angle which is very close to its angle of "best trim" and further offers considerable resistance to any change from its "free to trim" angle (Fig. 3).

It was during these overload tests that the importance of the wing and tail angular relationship to the hull was realized. As first designed, the model's forebody bottom was at 0° and the wing at 2° and while it took off successfully at 17 oz., it had too long a take-off run at 34 oz. and tended to plane bow-low (Fig. 4A).

The angular set-up was altered so that the forebody bottom was at 4° to the horizontal and the wing at 0°. The tailplane was adjusted accordingly to –2°. Thus, when aerodynamic forces came into play, the hull rode with its bow higher, closer to the best trim angle. The results were immediately apparent: take-off run was greatly reduced and since this trim resulted in the hull being slightly bow-high in flight, landings were smoother (Fig. 4B).

Summarizing: no aerodynamic forces should be permitted to oppose the natural tendency of the planing tail hull to plane at the higher trim angles with low resistance, both at the hump and beyond. Rather, they should accentuate this tendency.

Other important considerations were the thrustline position and angle and the effect of the slipstream on the horizontal tailplane. It is an inherent feature of the flying boat

that the propeller must be mounted high enough to provide adequate clearance and hence it exerts considerable nosing-down effect. The wing may be anywhere from the top of the hull to the thrustline. However, the higher the wing, the longer the wing tip float struts and the more vulnerable to damage they are. The lower the wing, the lower the center of resistance and, consequently, the more nosing-down effect the propeller thrust exerts. This resists the efforts of the hull to trim at the higher angles (around 8°) which have the lowest water resistance and acts as downthrust in flight. If the thrustline is tilted upward—given "up-thrust"—there will be a vertical component ahead of the CG which offsets the nosing-down couple. Also, the slipstream acts at a negative angle on the tailplane (Fig. 4) offering further "nose-up" effect, particularly at the commencement of the take-off when the model is moving at slow speed but slipstream velocity is high. Moderate up-thrust is therefore desirable.

We have the general layout of the hull as given in Fig. 5. Note the center of gravity position. This location is necessary to obtain the low hump resistance, since it permits the afterbody to carry its share of the weight at hump speed. You'll note that all dimensions are given in terms of hull beam. This then becomes the basic, all important dimension.

We believe that beam loading should bear some relationship to wing loading. Take the case of a model with a low wing loading and a proportionately high beam loading. This model will fly at relatively low speed. However, at this low speed, the hull would not be planing freely on the surface but would be dragging through the water. A successful take-off under these conditions is unlikely.

Take the reverse of the above; high wing loading with a low beam loading. This condition is more favorable to successful take-offs since the hull would be skipping along the surface before sufficient speed is attained for flight. However, your model would be penalized by the extra weight and drag of the wider hull. Of the two, nevertheless, a low beam loading is more desirable.

The graph in Fig. 6 gives wing and beam loading ratios based on the author's experience. The range of wing loadings covers the practical limits for model design purposes. To illustrate the application of these figures, assume we are designing a model whose estimated weight is 36 oz., with a wing loading of 12 oz. per square foot of wing area. The corresponding beam loading is 9 oz. per inch of beam. Hence, the beam would be: 36 oz. of weight over 9 oz. per inch of beam, 4 in. beam.

From this beam figure all other important dimensions of the hull bottom can be calculated. The forebody and afterbody lengths can then be varied within the limits shown in Fig. 5 to provide a suitable tail moment arm after locating the wing in the correct relative position to the CG. No tail extension should be necessary; simply locate the rudder and stabilizer on the rear portion of the hull (Fig. 2).

You'll note that the diagram in Fig. 5 gives only the actual planing surfaces; the shape of the upper portion of the hull is left to the reader's discretion. However, the depth of the hull at the step should be approximately 1 beam and at the sternpost (end of the afterbody) not less than 1/4 beam.

Suggested angular settings for the wing, tail and hull are as follows: Hull, +4° (measured from forebody bottom); Wing, 0°; Tail, −2 to −3°; Up-thrust, +2°.

These settings are given as starting points. The characteristics of your own design will necessitate some changes in these angles, which can only be finalized by actual test flights. END

## Radio Control News

(*Continued from page* 27)

this case power, or wattage, is figured by the formula $W = I \times E$, where I is in amperes and E in voltage.

For example, in a simple transmitter the applied voltage is 135V and the plate current is 20 ma. Hence $W = .020 \times 135$ or $W = 2.7$. If we had a transmitter with 90 volts on the plate with a plate current of 30 ma, we would still have $W = .030 \times 90$ or $W = 2.7$. The formula $W = I \times E$ is the most common one you will probably use, but wattage may also be figured if either the current or voltage is not known, provided the resistance and one of the other factors are known. For example, in figuring the wattage dissipation of a resistor, we would know the resistance (R) and either the voltage or the current; i.e., a resistor of 10,000 ohms has 10 ma of current flowing through it. Therefore, to find the power or wattage dissipated in the resistor, we use $W = I^2R$ or $W = .010^2 \times 10{,}000$ or $W = .0001 \times 10{,}000$ or $W = 1$. If we have a 10,000 ohm resistor with 50 volts applied across it, we use the formula: $W = E \div R$ or $W = 50^2 \div 10{,}000$ or $W = 2{,}500 \div 10{,}000$ or $W = .25$.

Power is energy, and since the opposition to all power or energy is friction or resistance, we cannot attain 100 per cent efficiency. The resistive losses in an electronic circuit manifest themselves as heat. When a certain amount of power is fed into an oscillator or transmitter, the power we get out depends on the efficiency. In general, for the transmitters used for RC work, this figure is between 40 and 75 per cent. Most of our work can be done with 1/2 watt resistors. However, if in doubt, take a little time and calculate whether a 1/2 w, lw or larger resistor is needed.

Several readers have wondered if a single cell of a car battery might be used for a 2V vibrator supply. This is an excellent source of power for such application. It is suggested that usage be alternated between the three cells of the battery, if the equipment is to be used for a long period of time.

Here are a few of the ideas we've seen in various installations and have been given by readers. Be sure, when using a metal mounting plate for jacks, switches, etc., that the ground connection is insulated from the plus terminals of your power source. It sounds simple but it cost one builder four new tubes before he found what the trouble was.

Now that cold weather is here, better keep a close check on your batteries. A dry cell (Leclanché Type) loses capacity as the temperature drops. A brand new 1-1/2 volt cell may read 1.65 volts when checked in your warm room. Placing a load on it may drop it to 1.45 to 1.5 volts, which is perfectly normal. But, it may only deliver 1.35 volts, or sometimes less, when out in the field with the temperature near freezing. A wet type cell can stand a much lower temperature and still deliver near maximum power.

Resistors and capacitors also are affected by a wide range of temperatures, unless, of course, they are of the temperature compensating type, of which radio control work uses very few.

Relays should be checked on the field for correct pull-in, drop-out settings. Since copper wire (in fact, all metals) decreases in resistance with a decrease in temperature, the resistance of your relay coil will be lower in cold weather than in hot. This is a good thing, inasmuch as the voltage output of your batteries also will decrease, thus effecting a somewhat stabilized condition. Theoretically, a change in temperature also will change the operating point of the relay by altering the permeability of the magnetic circuit. For all practical purposes, however, this can be

ignored, as the difference is hardly measurable. One of the biggest factors affecting relay operation in cold weather is the spring tension device for the armature. If you plan to do any cold weather flying do some scientific testing beforehand. Build a box and lid of 1/2 in. or 3/4 in. soft balsa, large enough to hold your receiver and batteries. Mount a suitable switch and meter jack on the outside and cover the box with Reynolds Aluminum foil. Place the radio equipment in the box and give it a check for proper operation. Now set the unit in the bottom of your refrigerator for about six hours, or until a thermometer placed in the box indicates the internal reading to be about 38-40° F. After the unit is thoroughly "soaked" in cold, remove from the refrigerator, turn on the switch, plug in the meter and see whether everything is working properly. Weak batteries probably will be unable to furnish sufficient power. Check the relay for correct operation. Some retuning of the receiver may also be needed. It's better to do this than crack up a model for lack of a little planning. Clubs could make a fine experimental project out of this. Remove any grease or oil that may be on relays or actuators, which would become stiff in cold weather and thus alter operating characteristics.

Fig. A gives an idea of the "motor-less" beep box by William B. Schwab of 4545 W. 150th St., Cleveland, Ohio. We used one of Mr. Schwab's original models of this unit this past summer and found it worked quite well. As shown, the unit is set for a self-neutralizing two-arm escapement. We used it on a Bonner Compound by shorting out points marked "2." Materials needed are a few scraps of spring brass .005-.008 in. thick, some small bolts or rivets for attaching the springs to the case, some bolts for the shafts and small scraps of 1/32 in. or .040 in. brass sheet for the disc and handle and lucite sheet 1/8 in. thick for the case. As noted, a spring returns the crank to neutral. Using a 3 in. diameter form, warm a piece of 1/8 x 5/8 x 10 in. lucite or plexiglass in an oven at 360°, or until pliable, and bend around the form. Cut off the excess length and reheat if necessary and then cement the ends together. Use cement obtained in model shops for plastic work or a mixture of 50-50 carbon tetrachloride and chloroform.

Cut two 3 in. discs from 1/8 in. lucite and drill a hole for an 8-32 bolt in the center of each. Cement the rear disc to the ring. The contact springs should be about 3/4 in. long and the piano wire pluck just long enough to overlap them about 1/64 in. Make up one set of contacts and fasten them in place to determine the correct size of both the spring contact and the pluck. In looking at Fig. A, contacts No.'s 2 and 3 should have a slight bend to the left so as to allow the pluck to over-ride them easily without causing excessive "bouncing" when moving in the opposite direction. The contacts may have a spot of silver soldered to them at the point of contact or they may be made of silver plated stock or they may be tinned lightly with a soldering iron. After the unit has the contacts and the control arm in place, drill two holes for crank stop, as shown. These should stop the crank at the point where it is making contact on the No.'s 1 and 4 position. The front cover is held on with screws, through the case, which were not shown for clarity. Connect all points marked "A" and all points marked "B" with short lengths of wire. A small micro switch should be mounted in the case, parallel with the transmitter key terminals for synchronization. This is not a construction article but we believe you'll be able to make this excellent beep box with no trouble.

Fig. C is a schematic of a single hard tube receiver by Paul Runge of Ace Radio Con-

(*Continued on page* 44)

# New Authentic Scale Model[s...]

## CHRIS-CRAFT 21' MONTEREY

**World's First Outboard Powered Boat Kit Designed for Radio Control!**

## $5.95

including all cast-metal fittings! Kit B-13M. Length 21'' Beam 7⅛''. For any gas or electric outboard motor.

It's the world's first—and naturally it's by Sterling! Never before a scale model outboard kit designed expressly for radio control! Entire cabin is removable. Kit includes die-cut mahogany cabin sides, windshield, aft bulkhead, flying bridge windshield, toe rail, catwalks, and other die-cut balsa and mahogany parts. Also plastic for windows, authentic decals, wire, and all cast-metal deck fittings. GIANT STEP-BY-STEP DRAWINGS AND INSTRUCTIONS. At your dealer's now!

Actual photograph of model built from kit. Manufactured from drawings supplied by the Chris-Craft factory.

# DESIGNED FOR [R...]

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| Fokker D-VII | C-8 | 5.95 |
| Corsair F4U-1 | C-9 | 5.95 |
| Ring Master | S-1 | 2.95 |
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|---|---|---|
| Richardson 27' Cruiser | B-1 | $5.95 |
| Higgins 17' Speedster | B-2 | 4.95 |
| Chris-Craft 47' Buccaneer | B-3 | 7.95 |
| Century Resorter '20' | B-4 | 3.25 |
| Century Sea Maid '20' | B-5 | 2.95 |
| Chris-Craft 32' Cruiser | B-6M | 9.95 |
| *Deluxe 34-pc. scale marine fitting set for Kit B-6M* | B-6F | 3.50 |
| Chris-Craft 50' Catalina | B-7M | 11.95 |
| *Deluxe 66-pc. scale marine fitting set for Kit B-7M* | B-7F | 4.95 |
| Century Sea Maid '20' | B-8M | 7.95 |
| *Deluxe 35-pc. scale marine fitting set for Kit B-8M* | B-8F | 3.95 |
| Higgins 26' Express Cruiser | B-9 | 3.95 |
| Harco '40' Deluxe Cabin Cruiser | B-10M | 10.95 |
| *Deluxe 64-pc. scale marine fitting set for Kit B-10M* | B-10F | 4.50 |
| Chris-Craft 63' Motor Yacht | B-11M | 18.95 |
| *Deluxe 108-pc. scale marine fitting set for Kit B-11M* | B-11F | 7.50 |
| Sea Dart | B-12 | 3.95 |

| MARINE DRIVES | Price |
|---|---|
| ½A (⅓'' dia.) Gas Marine Drive | $2.95 |
| A ($^3/_{16}$'' dia.) Gas Marine Drive | 3.95 |
| BC (¼'' dia.) Gas Marine Drive | 3.95 |
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Marine Fittings Also Available *Individually.* Ask Your Dealer.

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Actual photograph of model built from kit. Manufactured from plans supplied by the Cessna Aircraft Corp.

## $5.95

Kit FS-2
Length 30''
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For Class ½A and A engines.

## CESSNA 180

### Authentic Scale Model Designed for Radio Control!

This remarkably realistic model is designed for maximum performance with ½A or A engine with full load of radio equipment and batteries! Ruggedly yet simply constructed—it's a cinch for even the novice in radio control! Kit includes all die-cut plywood and balsa parts, poplar wing struts and motor mounts, plastic for windows, authentic decals, hardware, formed steel cowling, formed spring steel landing gear. Can be flown as free-flight, radio control or control line. EASY-TO-READ STEP-BY-STEP INSTRUCTIONS.

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trol, Box 301, Higginsville, Mo. The main feature is the 3E5 tube which draws but 25 ma on half of its filament. The miniature quench coil is handled by Ace Radio Control, ESSCO, 58 Walker St., New York 13, N. Y. and Control Research, P.O. Box 9, Hampton, Va. Paul reports that a 3V4 may also be used (using 1/2 of the filament) but the filament drain is higher and the current change is not as great. To adjust, the 1-8 mmf trimmer is turned to minimum capacity and then turned in toward maximum setting until a steady idling current is obtained. This setting will depend upon the antenna length.

### New Items

The Distler electric motor we described last month may now be had as a separate unit; the motor alone may be purchased from Polk's Model Craft Hobbies, 314 Fifth Ave., New York City for $3.50. This is the amazing ball bearing German motor which has its field *inside* the armature. From a 12 ma no-load current to a fully stalled 180 ma, this motor has ample power for beep boxes and servos.

Control Research is expanding its line of regular RC components to include a wide variety of battery boxes and gas tanks. Except for the plane kit and engine, this company supplies all RC needs.

In looking over the new catalogue sheets from ESSCO, we notice a rather hard-to-get item of interest to the multi-channel fan. This is the Neomatic reed bank. Measuring 7/8 x 7/8 x 3/4 in. for the one-reed unit and slightly larger for the four-reed unit, each weighs about 3/4 oz. Frequency range is from 100 to 1,000 cycles and the frequency suseptance is such that the reeds will not respond to any multiple frequency except the sixth. However, at this point it is down 60-80 DB. Through lack of mass on the reeds themselves, the unit will withstand about 10G vibration, *except* at the natural resonance of the reeds. The contacts will handle up to 50 ma at 24V with an arc suppressor for inductive loads. Who'll be the first to fly a multi-channel Half-A? In addition, ESSCO is now carrying a complete line of nationally advertised receivers, transmitters and actuators as the manufacturer supplies them, either in kit form or built-up.

Ace Radio Control has a new line of printed circuit receiver kits on the market and will soon follow with transmitters. Be sure to write for their new 14-page illustrated catalogue. We're glad to see that Paul Runge of ARC has accepted the challenge from our printed circuit discussions and has come up with something new and different for the RC field in this line.

For hobby manufacturers who desire to go to printed circuits, Sylvania now has a new seven-pin miniature printed circuit socket. Also, for the delux-custom installation, Methode Manufacturing Corp. of Chicago carries a variety of moulded phenolic plugs which will fit the standard seven-pin miniature socket.

Are you looking for a time delay unit which will operate on 2.5 or 5 volts and give a delay of from 2 to 120 seconds? The Amperite Co., Inc. of 561 Broadway, N. Y. 12, N. Y. has such a unit, sealed in a glass envelope the size of a miniature tube. Unaffected by altitude, humidity or other climatic changes, they plug into a standard nine-pin miniature socket. They may be actuated by DC, AC or pulsating DC current and come in either normally open or normally closed SPST circuits only. May be ordered through most radio supply houses. The Elly Electronics Corp., Box 395, Fair Lawn, N. J., also carries snap action time delay relays. Voltage start at 6.3 volts and they have a minimum time delay of three seconds. Also encased in glass envelopes.

Krylon, Inc., Philadelphia, Pa., is now marketing a small 98¢ can of acrylic plastic spray, both colored and clear. A good thing

for painting transmitter cases and the interiors of cabins and boats. Gives a professional paint job to your work. Available through hardware stores and radio supply houses.

### Club News

One of the most interesting letters we've received in quite some time came from Frank Baker of Rochester, Minn. Frank and the boys from the local hobby shop played host to Dr. Vittorio Puddu, Director of the University Heart Center, Rome, Italy. While on a visit to the Mayo Clinic, Dr. Puddu showed the boys he could fly a Royal Rudder-bug with great skill and precision. Dr. Puddu, who is one of only a dozen or so RC fliers in all Italy, said that in his native land, Italian copies of ED and ECC equipment are widely used, with the most popular receiver using a 3Q4 tube and having a current change of 4 ma. Relays are those obtained from radiosondes which are salvaged by the RC fans from the surrounding countryside. The 200 ohm coils are rewound to 4,000 ohms and the relays, once set, need no adjustments whatsoever. No crystal control is required. Dr. Puddu flys a 7-1/2 lb. English Radio Queen with a 3.5 cc Diesel. His 10 in. nylon prop has lasted through three or four months of flying—hmmmmm! MAN is received each month and there is little or no trouble in obtaining the needed RC parts shown in the magazine. Many thanks to Dr. Puddu and Frank Baker for a peek into radio work abroad.

The First Annual All New England RC Model Airplane Contest was held at Grafton, Mass., the latter part of September. Phil D'Ostilio won the John K. Ross perpetual trophy award for being the high point man. The 21 registered contestants (about 20 more builders kept their planes in their cars because of high wind) made a total of more than 55 official flights, and, surprisingly enough, interference was noted on 465 mc, a very rare occurrence. The Trixter Beam was the most popular plane, with Bill Villette taking top honors in the beauty event with his 14-coat silk covered Beam. The spot land event was nip and tuck between D'Ostilio's 17 ft. and the winner, R. T. Ryan, who came within 10 ft. 4 in. of parking on the spot. The feature of the contest was the two mile race which despite the strong wind, was won by J. R. Rimmer with a time of 8 minutes 34 seconds. This figures out to about 14 mph for the 8 lap quarter mile triangular course.

The East Park Model Club of East Park, N. Y. is one of the up and coming RC groups. Long noted for their participation in and winning of U-control contests, this club is producing some very fine RC fliers. In view of the fact that none of them had the slightest idea what radio control was about when they started, they have proved that common sense in following directions can pay off.

L. W. Johnson of Tawara Terrace, N.C., is having a rough time of it with RC activities in his neck of the woods. After belonging to the San Francisco Mustangs and the Atlantic Model Engineers, he is interested in drumming up a little interest in North Carolina. Anybody help out? His one big question is how to check the frequency of a crystal. This is rather difficult because of the specialized equipment needed. His best bet, as with everyone, is to buy a Petersen Z-9 crystal for 27.255 mc. Practically all of the circuits given for RC transmitters use this crystal and therefore you won't have to worry about its being on frequency. Control Research, Polk's Model Craft Hobbies, Ace Radio Control and ESSCO are but a few of the suppliers of this crystal. After retiring from 20 years in the Marine Corps, what could be easier than radio controlling a model? Let's hear how you make out, Mr. Johnson. END

## Flash News

(*Continued from page 6*)

European carriers handled 252,800. So far this year the European carriers have been running ahead of Pan American and Trans World Airlines. However, these two lines, together with Trans Canada Airlines, are competing with a formidable array of European carriers: Air France, BOAC, SABENA, Swissair, KLM, El Al, LAI and Scandinavian Air Lines. Trans-Atlantic leadership for individual airlines will stay with the U.S. for some time to come, however, with PAA and TWA individually carrying well over twice as many passengers as any other airline.

The 479th Fighter Wing, George AFB, Calif., is the first combat wing to receive the new, supersonic North American F-100 *Super Sabre* fighter. First airplanes are now being received but the complete wing will not be fully equipped for more than a year as apportioning of a few F-100's to other wings continues for indoctrination and service training. Meanwhile, North American has received a new $100-million production order for more F-100's to be built at the company's Columbus, Ohio facilities.

Defense Department has completed plans for procuring about 7,000 military aircraft annually at a cost of about $10-billion following completion of the 137-wing Air Force program on June 30, 1957. The Air Force estimates that it will be able to keep its 137 wings modernized after that date by buying 4,600 airplanes annually at a cost of about $1.5-million each. The Navy estimates that its flying units can be kept up-to-date by buying 2,400 airplanes per year costing an average $1-million each.

Possibly the ultimate in the new emphasis on "lightweight" fighters is the British Folland Midge, demonstrated at the annual SBAC Show at Farnborough, England. With a span of only 20 ft. 8 in. and powered by an Armstrong-Siddeley Viper turbojet engine of 1,640 lb. thrust, the tiny fighter has a top speed of better than 600 mph and can fight at 40,000 ft. Folland engineers point out that the Midge can be built for one-fifth the man hours and cost of the conventional-size fighter yet can perform as well. Therefore, they say, it is proper to compare the defensive power of five Midges with a single current jet fighter. The full-combat version will be the Gnat, whose 5,000-lb. thrust Bristol Orpheus jet engine will give it supersonic speed in level flight and a ceiling of more than 50,000 ft.

Pan American World Airways is studying the possibility of inaugurating non-stop service between Tokyo and Seattle with its Douglas DC-7C transports, 15 of which are on order. The new "Seven Seas" giant features 10 ft. additional span and 3 ft. additional length over the standard DC-7. Powerplants are to be new Wright DA-4 Turbo Compound engines giving 100 hp additional in climb power over current versions. Chief feature of the new transport is a fuel capacity of 7,860 gal., compared with 6,400 gal. in the DC-7. With this added fuel and improved performance, Pan American studies indicate the new Seven Seas can carry 62 passengers in de luxe accommodations over the Tokyo-Seattle route in 12 hr. 30 min., an average speed of 383 mph for the 4,793-mile flight.

Lockheed is also planning to produce a new wing for the Super Constellation transport, whose thicker wing has caused it to lag behind in the speed race with the DC-7. The new Lockheed transport, to be ready in 1956, would be powered by four Allison T56 turbo-prop engines of about 4,000 hp each, giving the new-wing Super Connie a cruising speed of 400 mph.

The Air Force, while avoiding precise figures, admits officially that its current orders for the giant Boeing B-52 *Stratofortress* eight-jet intercontinental bomber is for "more than 100." The swept-wing monster is being built at Boeing's Seattle, Wash. and Wichita, Kan. plants as part of the Air Force's "second source" principle of distributing vital weapon production in widely separated areas. END

## Contest Calendar

### DECEMBER

5—*Phoenix, Ariz.:* Class A Model Rodeo for CL, CLS, Combat, RC, TR, FFG, TLG and OHLG. Quentin T. Webster, Contest Director, 521 E. Camelback, Phoenix, Ariz.

12—*Bakersfield, Calif.:* Bakersfield Record Trials for FFG, TLG, OR and OHLG. Clinton Merrill, C.D., 212 Washington, Oildale, Calif.

26—*Fresno, Calif.:* Fresno Gas Model Club Record Trials for FFG. Jim Scheidt, C.D., 2225 Brown, Fresno, Calif.

29-31—*Miami, Fla.:* First King Orange Internationals for FFG, FFFS, FAI Power, RC, TLG, OR, OHLG, CL, CLS, Combat, CLFS and TR. Charles R. Quick, C.D., 1896 N.W. 36th St., Miami, Fla.

### FEBRUARY, 1955

20—*Phoenix, Ariz.:* Class AAA Fourth Annual Southwestern Regional Meet for FFG, OR, TLG, OHLG, RC, CL, CLS, Combat, FFFS and CLFS. Quentin T. Webster, C.D., 521 E. Camelback Rd., Phoenix, Ariz.

(*Continued on page 48*)


DMECO MODELS
"AMERICA'S FINEST"
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GOOD REASONS WHY THEY ARE BEST!
HARDWARE... Durol Gears! Nuts & Bolts! Screws! Covering! Wire! Decals! in most kits . . .
DRAWINGS... All the parts are shown full size! Complete Assembly views and instructions! Engine Installations and Test proven accessories listed!
MATERIALS.. Premium selected Grade A/1 balsa is used! All hardwood parts are tough seasoned maple! Plywood is 1st grade oil proof Aircraft quality!
REDI-MADE... All parts are precision finished to close tolerances using DIE-CUTTING, CARVING and SHAPING to the best advantage!
DESIGN... The design is right for the job to be done! Only after months of vigorous, all out field testing is it offered to you! — and they are exclusive too!
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DMECO MODELS FOR FUN AND PLEASURE
"SPEEDWAGONS"
FOR CLASS "A" THE '20' $3.95
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1/2 A TEAM RACING
A REALLY FINE DMECO KIT.... $2.95
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THE VERY FINEST FOR RADIO CONTROL
"LIVE WIRE"
The name that signifies the PROVEN BEST for all R/C flying.
Only with Live Wire Models do you get all of the Superior design Features!
$6.95
THE "TRAINER" .08-.15 ENG
THE WORLD'S MOST POPULAR R/C MODEL!
NEW!
$14.95
FREE FLIGHT
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1/2A
THE "CLIPPER"
$14.95
THE "SENIOR" 19-23 ENG. CUSTOM BUILT
LIVE WIRE "Cruiser" $3.95
dmeco's NEW REALISTIC RADIO CONTROL MODEL!
THE "KITTEN" R/C
FOR THE BEST R/C FLYING ____.
ACCESSARIES APPROVED BY THE EXPERTS!
R/C AND CONTROL LINE FLYING
.09 TO .23 ENGINES
$1.29
Positive Flow
FUEL TANK
THE TANK WITH THE "INTERNAL SWIVEL"
PATENT PENDING
MULTI-SERVOS
MOTOR DRIVEN R/C ACTUATORS
POWERFUL-DEPENDABLE!
Using your simple single channel radio without changes you can have your choice of single or multiple controls, selective to your command. Install one in your model now and use less batteries at a lighter weight! There are no linkage or rubber band problems, these worries are gone forever with ½ lb. torque, motor driven "Multi-Servos"
4
MODEL 2PN . . . $11.95
MODEL 3PN . . . $14.95
MODEL 2P2N . . . $11.95
MODEL 3P . . . $10.95

### JUNE

12—*Ft. Wayne, Ind.:* Mad Modelers' Meet. Walter A. Krull, C.D., 414 E. Washington Blvd., Ft. Wayne 2, Ind. Pending.

### JULY

10—*Joliet, Ill.:* Exchange Club of Joliet Flying Circus. Glenn F. Stearman, C.D., 604 Abe St., Joliet, Ill. Pending.

### SEPTEMBER

5—*Far Hills, N. J.:* Class AA Bedminster-Far Hills Lions Club Annual Control Line Meet. C. M. Vanderwaart, C. D., Box 151 Bedminster, N. J. Pending.

KEY TO LISTING OF EVENTS: FFG — Free Flight Gas; CL — Controlline Speed; OR — Outdoor Rubber; TLG — Towline Glider; IR — Indoor Rubber; OHLG — Outdoor Hand-Launched Glider; IHLG — Indoor Hand-Launched Glider; CLS — Controlline Precision (Stunt); CLFS — Controlline Flying Scale; RC — Radio Control; TR — Team Racing; FFFS — Free Flight Flying Scale; PL — PAA Load; CC — PAA Clipper Cargo.

Contests designated "pending" mean the application is before the proper authorities as we go to press; "Record Trials" mean no prizes, but a chance at cracking the records; "Class A" is a meet with restricted entry; "Class AA" is a meet with unrestricted entry; "Class AAA" is a state-wide or regional meet; "Class AAAA" is a national or international meet.

## MAN at Work

*(Continued from page 2)*

"We want to adapt PAA Load Event to the International classification — the 2.5 cc displacement (or .1525 cu. in.) engines flown in FAI gas power.

"We now propose," Gardner continues, " a classification for an American Class to be flown with Half-A engines and an International Class to be flown with 2.5 cc displacement engines. No more A and B. Payload requirements have been upped and the occupants standardized for all classes, including Model Clipper Cargo.

"The International pattern of flying — five official flights with two attempts for each official flight — has been adopted. Engine-run is 15 seconds maximum and official flight is 30 seconds and over."

Because the rules run to eight typewritten pages, we can report only the most important facts here. Interested readers should direct inquiries to Mr. George Gardner, Pan American World Airways System, 28-19 Bridge Plaza, N., Long Island City 1, N. Y.

The standardized dummy measures 3 x 3 x 1, with a 1 x 1 x 1 head, and weighs no less than 5 oz. In the American Class, or Half-A, one dummy is carried; in the International Class, three, which makes a total of 15 oz. Empty weights (less fuel and dummies) are 5 oz. minimum for the small class and 15 for the big class. This results in a 10 oz. minimum gross for the small fellows and 30 oz. for the .15 jobs. The 5 oz. dummy, of course, also is carried in the Clipper

Cargo Event, in addition to the cargo.

To say the least, we now have an inexhaustible topic to discuss around hot stoves, although lucky Californians will be putting test ships up into the smog by now. MAN at Work believes PAA has done a smart thing by lowering displacements, though by now you'd think we'd know better than to raise a bandaged head. Free flight displacements always did overshoot the mark and it has taken years to shrink the upper end without any tangible results.

While the big argument centers about the limit on power, it may be suspected that a few people may be unhappy with the five flight business and the three dummies necessary in the International Class. The latter point should be left to those who fly PAA Load. But five flights can be demanding, especially at bigger meets. It took a day to get in your flights in the Nordic Event at the last Nats. Naturally, in the interests of international competition — and we should be flexible on any rules that further international cooperation — the five flights with a maximum of three minutes each is the FAI way of doing things. That the five-flight FAI rule dissipates the luck factor, we doubt. At Westhampton, during the International FAI power finals, it was obvious that any airplane on the field needed a thermal to get the three minutes. Therefore, a guy needed even more luck on five flights instead of three. Anytime a three-minute flight is posted, luck is a factor. When three, four and five three-minute flights are made by one contestant, he has had plenty of luck. When you carry a generous payload, it will take even more luck to reach three minutes.

An interesting, perhaps significant, sidelight is the almost identical loadings of the International Class PAA Load job and the .15-powered radio models. It is possible to estimate closely what kind of performance will result from these new rules. Take a Live Wire Trainer. People have flown these jobs at all weights up to 50 oz., a hot combination being the Mac "9" allowed to turn up on an 8 x 3-1/2. With the Torp .15, the Trainer is a homesick angel unless power is somehow restricted. At 35 oz., very light for the Trainer, a .15 would almost satisfy a free flighter. Knock off that fat cross-section, go to more efficient higher aspect ratio wing for weight lifting, gross 30 oz. and you still have a worthy airplane, even at 15 seconds' motor run. With a high torque Diesel, the three-men-in-a-row cargo should have a dizzy ride. What say?

• • •

▸ Speaking of changes, MAN has one this month that should make everybody happy. Well, it's more in the way of an experiment, but we think lively modelers will go for it. By almost doubling the size of the full size plan, it was possible to include in this January issue probably the greatest collection of building projects put together in one month for many years. One side of this monster sheet features the full size layout of Chet Lanzo's marvelous SE-5 for free flight and radio. It's the biggest full size subject we've ever published. On the reverse side, there are Don Still's combat Nobody and Gary Witt's Half-A Curtiss Robin. The price increase that goes with this super plan is only to keep us from losing our shirts. If you like this super plan, let's hear. Would mean an extra featured model every month. For beginners, sport fliers, or those who can't wait, there's a full size plan in the magazine. It's a lovely little crate by Pete Chinn, called Tufnut.

• • •

▸ The English are having themselves a time with record breaking and "first time" flights in RC. Having hopped the Channel (see pages 16-17), they've upped the endurance record again, this time by a walloping mar-

gin. The new record, set by Hilton O'Heffernan with a Mills 1.3 Diesel, is 2 hours 31 minutes. If you've ever made a 15 minute flight in RC, you can imagine the shape of this boy's nerves after two and a half hours! It's about time some American modeler did something about this, such as shoving a couple of more feet span on a big Live Wire, fitting it with transmitter batteries and flying all day. Dawn to dusk is the ultimate — or will some Englishman put lights on them, too? ... And from Vic Stanzel, re the Monoline article last issue, the news that Monoline speed jobs peppered the record book at the Southwest Model Airplane Championship in Dallas, over the Labor Day week-end. Hear, too, from many states that this was the contest to end all contests. Dale Kirn's jet swooshed around at 154.98 mph and in A, he hit 134.68. Unofficially, Kirn got the jet up to 162 mph. Jim Clem and Sam Beasley took first in Half-A and B with Mono-line set-ups, also flown by Jimmy Sommersett, Dimmit Perkins, Leo Holliday, Leland Morton and others.

• • •

▸ Nate Rambo, who, in his Flypaper column, is always afraid someone will confuse him with MAN at Work — shucks, boy, get yourself an electric fan — turns out to be the chief designer for Springfield Models. He did that Spirit of St. Louis RC. Nate sparks RC around the City of Brotherly Love — must have been before they all got on 27! Reminds us that we've seen a couple of those little sheet wood Springfield bipes corkscrewing up like mad out at the flying field.

• • •

▸ If you have back issues of various aviation mags, the Smithsonian Institution needs you! Their National Air Museum wants to swap or receive gratis copies still missing from their reference library. For "want list" and dope on duplicates available, write to Robert C. Strobell, Associate Curator, Smithsonian Institution, Washington 25, D. C.

• • •

▸ Four hundred dollars in prizes being offered by the Munitalp Foundation, Smith Bldg., Greenwich, Conn., for papers written on various aspects of meteorology. Glider pilots and free flight modelers have the inside track on this one. Among many sample possible subjects listed was: "The Strength and Size of Thermals near the Ground as Demonstrated by the Soaring of Models." Munitalp is cooperating with the Soaring Society of America and the American Meteorological Society; awards to be announced at the National Glider Contest in 1955; deadline for papers, May 1. Write Munitalp for rules.

• • •

▸ New clubs: Great Bend Circle Dusters, boats, planes, 24 charter members. Address Bob Arnett, Phillips Sporting Goods, Great Bend, Kan. . . . Chicago Controlline Assn. includes Balsa Wasps, Oak Lawn Aero Modelers and Chicago U-Liners. Aims at helping the novice as well as promoting competition. Teams picked by each club compete in each event. Each team must have a novice member . . . Skydevils, Riverdale, Md., regrouping. New members wanted. J. G. Gray, 5602 54th Ave.

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And as we go to press, Pan American advises changes in the proposed rules above: In the America Class, old 4 oz., Half-A dummy is to be used, plus a 1 oz. cargo. If 1 cc engine used, payload must be 2 oz. In International Class, one standard 8 oz. dummy will be carried, plus 8 oz. cargo, for a total of 16 oz. Half-A dummy measures 1-1/2 wide, 2-1/4 to shoulders, 3/4 thick, 3/4 cubical head. International, 3 wide, 3 to shoulders, 1 thick, 1 cubical head. AMA flight rules: six attempts, three officials. In foreign competition, FAI rules are optional: five flights, two attempts for each. END

## Foreign Notes

(*Continued from page* 35)

**Tigres in New Zealand**

D. A. Walker of Ashhurst, Manawatu, New Zealand, disagreeing with our comment, when dealing with the Miles .29 Diesel, that Diesels of this size and bigger have largely disappeared from European markets, points to Italian Super-Tigre G.19 Diesel motor of .29 cu. in. displacement and says that several of these motors have been giving good service in his club.

Sorry, New Zealand, but the G.19 Diesel has been off the market for quite some time, having been superseded by Super-Tigre's G.21 glow plug model of the same displacement.

**French Modeling Decline?**

In 1945-1946, France was hitting the modeling headlines. She had raced ahead with the production (albeit in small numbers) of a dozen different model engines and her contest men were showing Europe how to fly both free flight and controlline. A year or two later, French speed fliers were the fastest in Europe and, later still, French RC experts were making British RC men look like beginners.

But now France has almost dropped out of the picture: her international contest representation has dwindled; her model industry appears dormant. Would any French modeler care to comment? END

## Curtiss Robin

(*Continued from page* 18)

by first carving a nose block. Next, cut cowling sides from 1/8 sheet balsa according to plan. Then cut out motor mount from 1/8 plywood and cement 1/8 square balsa all around edges. Fit all six pieces together, only lightly tacking in the nose block to insure tight fit, then assemble to fuselage. Shape nose block to cowling with sandpaper at this time. Be sure to cement all parts thoroughly. If you use Ambroid, follow the directions on the tube.

Silkspan, Japanese tissue or silk will cover this type of model well. Silk is most durable but may add weight because additional coats of dope will be required. Apply your covering with thick dope, smooth out wrinkles with your fingers while dope dries, and finally watershrink.

Silkspan tissue is recommended with the following as finishing procedure: Diesel-powered Robins need not be fuelproof; however, for a glow plug engine powered model, spray on three coats of clear Butyrate dope using six to eight drops of castor oil to every 3 oz. of dope. You must use plasticizer with Butyrate dopes to make it elastic since it never really stops shrinking. Two coats of color will cover if sprayed on in medium weight coats.

The cowling may be given several coats of dope thickened with talcum powder. Use pigmented dope with the talcum. Sand all coats until bare wood just begins to appear. Then coat again. Finish final coat with 280 emery paper then apply five to eight coats of color dope. Finish with auto rubbing compound (what you don't use, Dad can use on the car). While Aero Gloss, used here, is not necessarily recommended it is a colored Butyrate-type dope. Testor's also makes colored Butyrate.

Adequate ventilation is essential for all types of engines and imperative for Diesels in hot weather. Several outlet holes may be cut in the bottom of the cowling without detracting from the model's beauty too much.

Do not forget to include a carefully printed sheet telling the judges of the outstanding features of your Robin, such as scale structure, shock absorbing landing gear, etc. If you add details not included here,

explain what they are, particularly if they are inconspicuous.

Flying the Robin with more power than the Space Bug Jr. shown may cause looping; however, with adjustments as shown and the CG at 30 per cent of chord, the Robin will climb quickly but realistically in a left circle. Fill the gas tank with clean balsa chunks in an effort to reduce the power flight to about 30 seconds. The short engine run may mean the difference between first and second place. Good luck! END

## Channel Hop!

(*Contained from page* 17)

little matter of skipping across the intervening 22 miles of wet stuff that separates Britain from France — which is not such a straightforward task as it sounds, since the area is known for its frequent weather changes. Also, even if helpful off-shore winds usually prevail for the first few miles from Dover, these soon give way to strong land breezes blowing from the French coast.

At 1:35 p.m., with George Redlich already circling overhead in a high-wing Auster Autocrat, Sid Allen pressed the transmitter button for a final control check and then signalled helper Roger Clark to heave the model skyward. Weight at launching was 7-1/2 lb. (with 1-1/2 lb. of this being accounted for by three pints of fuel) and although an unaided take-off had originally been planned, the long grass on top of the 600-ft. high Dover cliffs made this impractical.

Once airborne, the job climbed steadily, with air control being taken over a few minutes later by George Redlich (someone else flew the light plane!), who carried the second transmitter in his lap. Weather conditions at the time included a layer of high cloud and scattered strato-cumulus with bases at 2,000 ft. Wind at 2,000 ft. was approximately 40 miles an hour from the northwest, with ground visibilty being limited to about nine miles on account of heavy haze.

The 90 hp Cirrus-powered Autocrat was chosen as the escort aircraft since it could be safely flown in steep turns at 40 mph, plus the important fact that the generous cabin windows and all-perspex cabin roof provided good all-around visibility. Pilot Norman Ashe soon realized that it would be all too easy to lose sight of the model at distances much over 300 yards, so to slow down his ground speed to match that of the Radio Queen, he had to fly a continuous figure-eight pattern. This naturally rendered the magnetic compass useless and toppled the Gyro direction indicator, so from thereon the route had to be flown entirely by visual reference to the indistinct outlines of the British and French coasts.

It was found best to fly slightly beneath the model as it stood out in sharp contrast against the sky. Stop watch and altimeter checks showed that the model climbed to 1,000 ft. above sea level in the first eight minutes after launching and then from 1,000 ft. to 3,100 in 17 minutes. At this point George decided to spin it down to the 2,000 ft. level again (no elevators were fitted), where he breathed a big sigh of relief when the wings didn't fold on the pull-out. Several such dives were necessary to keep the model from climbing to its estimated 4,500 ft. ceiling, at which it would have probably overshot the target, on the glide!

Apart from a slight tendency to turn left, which was corrected by right rudder application at one-minute intervals, the flight was otherwise uneventful until the French coast was crossed at 2:15 (40 minutes after take-off), with the Hunter still droning on steadily. Control had been maintained at all times, but after George brought the model

down to 800 ft., he unfortunately lost sight of it and after a fruitless search was forced finally to put down at Marck Airport, Calais, without knowing its whereabouts. Happily, the model was soon located in perfect condition in a field five miles to the southeast of Calais, to the relief of its co-owners, who were already well into planning their next big flight — that of having a crack at the long distance record at present held by the USSR! END

## Nobody

(*Continued from page* 14)

onto that line a 3 in. wide sheet of 1/16 x 36 in. balsa. This will form a "T." Lay this "T" on the plans and mark off the positions for the half ribs. Now cement these half ribs onto each side of the "T." Let dry 30 minutes, then proceed to cement the diagonal ribs onto the back of your "T." You will notice that they join every 4 in., or at every other set of front ribs. By cementing two ribs at a time, you can angle them up together and join them at the trailing edge in a "V" with cement. This makes lining them up extremely easy. After all the ribs are in place, the trailing edge sheeting can be slipped on, or it can be built up on the board. This trailing edge does all the final lining up and if you are in no hurry, to assure against warps, let this structure stay pinned down all night. If you are in a hurry, let it set a while and be cutting on the two plywood reinforcing pieces that strengthen the center section and provide bearing surface for the motor mounts.

Cement these plywood pieces on each side of the horizontal sheet spar, drill holes for the mounting bolts and insert the blind mounting nuts. If you have never used these handy little gadgets, try and locate some, or just use the old method of soldering the nuts to a plate of tin or brass. This system makes your mounts expendable and carrying an extra set of mounts is the same as having an extra airplane (*almost*)!

So back to the wing. The front sheeting may now be cemented in place. Try to select your wood very closely for these sheets, as well as all the wood throughout. Extra light, clear grain wood is what you are after. No heavy quarter grain is needed in this model. I think using more light pieces of wood is better than using fewer heavier pieces of wood, no matter how heavy. With the sheeting in place, including the center sheeting over the already installed bellcrank, leadouts and pushrod, you are ready for covering, with the exception of adding an ounce of weight to the outside tip. Cover it, dope it, cement on your rudder, hinge on your elevator, bolt on your motor mounts and motor and you have got yourself a real "NObody."

Well, now that it is built, let's see why it was worth the effort. For those of you who are not combat fliers, you have a rather unusual design, a sort of flying wing (I hate that word for some reason). At any rate, every time I drag mine out to the flying field, it draws a lot of comments, and I am assured that yours will draw comments, too. Wait a minute, maybe I said the wrong thing!

And what has the "hot combater" got to match his talents? I'll tell you. Nobody is no slouch for speed — it does over 80 mph. It will turn, not on a dime, but on a worn nickle. The main thing here, and I really mean *main*, is that it loses very little speed in maneuvers. This is the best characteristic a combat model can possess, and the one most ships don't have. A lot of ships turn tightly enough but they lose so much speed while doing so that it puts you at more of a

disadvantage than just flying level. As long as your speed is up you can at least try and outrun the other fellow, but when your speed falls, you are a sitting duck.

Another little thing about the Nobody is the ease in transporting this model. By unbolting the motor mount unit you have a plane that will fit in a 15 x 42 in. space and will stack very neatly. When you have a lot of fliers with a carload of models, an awkward combat ship is hardly worth the space required to carry it.

One thing I failed to mention is the final weight of this ship. The three I have built came out 18, 20 and 21 oz. Do not make the same mistake I made. To achieve the 18 oz. I cut holes in my spars and ribs; it didn't improve the performance one bit and weakened the structure, as was seen at the Nationals when, after one good mid-air crash, the wing broke in two right next to the plywood reinforcing where I had relieved the sheet spar of some wood. With the best grades of wood the weight can be kept down to 18 oz. without cutting wood away. Considering that the wing has 480 sq. in. of wing area, a model weighing 28 oz. would have an extremely light wing loading.

Did you notice there is no drag? Symmetrical foils constitute very little drag and, with no fuselage or landing gear, the only drag comes from the motor. With the motor right up there in the breeze it stays cool, and this is necessary to insure a steady motor run from beginning to end. Also, an upright mounting is preferred. Do I burn when I get my motor started in a couple of flips and get in the air and just stand there while the other fellow with a side-mounted motor is lying on his back on the concrete trying to get the poor flooded thing started? Keep that motor upright and you save a lot of worries.

Along the line of worries, I have designed a combat ship or two that filled the bill in every respect, with the exception they were not worth a darn for combat. Because I had to keep my eye on my own plane (to make sure it wasn't free flighting across the top of the circle), I could not concentrate on what the other fellow's plane was doing. I don't know exactly what to attribute it to on the Nobody, but it stays out. You can take it up to the top of the circle and hold it in a 10 ft. overhead loop the entire flight. This I like.

Stability seems to come from the short coupling, contrary to some modelers' beliefs. As long as you aren't working the handle and do not have a sensitive bellcrank set up, the short coupled plane is stable as a rock. This means when your competitor goes low (and you aren't flying AMA rules), you can go right after him. Nothing pleases me more than to get a "keep-away" flier right on the deck and keep him there, most of the time for good. After all, combat is a sporting proposition; stay up there and fight it out to the end.

This leads me into some views on tactics. One rule is all you have to remember here. *Stay behind him* — if you have gotten all his streamer, or if you have none! Lots of fliers, as soon as they get a little streamer, start evasive maneuvers. (I am referring to an elimination type of flying.) I used to do it myself, and I lost more matches that way! Just as in any sport, a defensive attitude is bad psychology. Always stay aggressive, or at least look that way, by trying to stay behind your opponent. After you have gotten all the streamer you desire, don't go in too close from there on out, but stay behind him and he can't possibly cut you. When it is elimination type contest, be satisfied with cutting a nice piece of your opponent's streamer. Going for it all makes a wonderful show but can put you in a dangerous position. As you are diving for that last 3 in. of streamer,

you can overshoot and hit the plane, or even worse, dive right over him leav.ng your entire streamer, guess where?

As for trying to plan and remember a tricky set of maneuvers, unless you have already mastered the art or have a constitution that relaxes rather than gets excited when you fly combat, you can abandon the idea quickly. Combat is a spontaneous thing, you have to do what seems right at the moment and you have only a moment to decide. With two fast planes within inches of each other, it is hard to remember Plan X for evading while in such and such a position. About the only plan I can say to follow is, *to follow*. No matter what he does, follow him, with the exception of a crash. Then let him go his way and you go yours. Following also helps keep the lines from tangling.

Just one word to sum up the flying procedure. *Be prepared.* When it is your time to fly, have a plane that is ready, a motor that is dependable and well broken-in, the right size lines, all the little things checked, such as prop nut and mounting bolts tight, and be confident. Even though a lot of luck goes into combat, I am a great believer in making your own luck. Don't approach the event with the attitude of "if I'm lucky, I'll win." Fill your mind with confidence that you are going to fly your best and that your flying is what is going to win, not your luck. Who knows? The next time you compete it may be a Nobody that wins, and that Nobody may be yours. END

## Tufnut

(*Continued from page* 21)

piece of wire. A drill will also be useful for boring the 3/32 in. dia. holes for the dowel for the wing rubber and rear motor peg. Secure these with cement and also put a little cement around the landing gear notch and binding.

The next thing to do is to add the two side pieces which reinforce the nose. "Pre-cement" the joints by rubbing cement into the four surfaces to be joined. When these are dry, apply more cement and pin the strengtheners to each side of the nose. At this stage, too, the wing platform should be added. Having made sure that the fuselage is quite flat and at the right angle at this point, pre-cement this, too, and then pin in position.

The tail unit is the next thing to fit. Again, check that the fuselage is true and flat, then pre-cement the surface. When dry, cement and pin the stabilizer in position, after accurately alining it. Let this dry for a while, then remove pins and cement rudder in position, again after pre-cementing. When fitting the rudder, view the model from the front to make sure that the rudder is in line. Finally, add the small dorsal fillet which helps to strengthen the rudder fitting.

The wheels may now be added. These are just slipped over the axles, the latter being bent up at the ends to retain them, or, if preferred, wheel retaining collars can be fitted. A piece of brass tubing, 1/2 in. long, is used as a propeller shaft bearing. The nose of the fuselage is carefully drilled or reamed out to the required size and the tube then inserted with plenty of cement to secure it. At this stage, the corners of the fuselage and the nose may be rounded off with sandpaper.

The propshaft should have the rubber motor hook bent to shape first. It should then be passed through the nose bearing and, after adding two washers, the propeller may be fitted. If a plastic prop is being used, it will first be necessary very carefully to drill a 1/32 in. dia. hole in the hub parallel to the shaft hole. The end of the shaft is then bent over and pulled back into this hole as shown on the plan. This completes the first stage of the assembly. We now come to the wing

construction and covering.

You will note that only the left-hand wing is shown in the plan. The first thing to do, therefore, is make an accurate tracing of this. This tracing is then reversed to give us the right-hand wing panel and is then added to the plan as shown. Make sure that you have the two half drawings accurately alined. If you do not want to spoil your plan, it is a good idea to cover it with a piece of transparent waxed paper. This will prevent the framework from sticking to it. If waxed paper is not available, a piece of grease-proof paper, although not quite so satisfactory, will do.

Start assembling the wing by pinning the full length leading and trailing edge strips in place. Ready-shaped, trailing edge stock is available at most dealers and saves the necessity of sanding down to the required triangular section.

Now insert the ribs at the various stations as shown on the plan. Pre-cement each joint for maximum strength and make sure that each rib is upright. Add the 1/8 in. sheet balsa wing tips and then fit the center spar. This spar is in two parts, left and right, and there should be a 3/16 in. gap in the center to allow it to close up when the tips are raised for the dihedral angle.

When the wing structure has been completed, the leading and trailing edges should be notched, as shown on the plan, to allow the outer panels to be raised at the tips. The center section should be very firmly pinned down to the building board and each tip blocked up 1-1/2 in. after squeezing some cement into the notches. Finally, the dihedral keepers should be cemented in place and the whole assembly allowed to set for about one hour. After this, it may be removed from the board and the leading edges and tips rounded off with sandpaper.

We now come to the job of covering the wing with tissue. You may find this just a bit tricky and tedious at first. We can only say that even the experts found covering tricky when they first started to build model airplanes and that when you have built one model plane, you will find that covering the next one is a lot easier.

Model tissue comes in various colors and grades. We would recommend an American tissue, such as Silkspan, rather than one of the Japanese varieties. Japanese tissue may be all very well for lightweight contest jobs, but Silkspan is a lot easier to apply. Dope is usually employed for sticking the tissue to the frame. This means that you have to work fairly fast because dopes dry quickly. We believe that Kodak photo paste is more suited to the beginner. This dries more slowly and gives the builder more time to get his tissue onto the framework evenly; also, the paste is not so wet and does not soak into the tissue and temporarily weaken it during the process of pulling the covering over the framework. As a substitute, mix a little cement and dope, but use this only for sticking down edges of the paper.

When you buy a sheet of tissue, it may be a bit creased and wrinkled. It is worth while, in this case, to smooth it out with a warm iron. The next thing to do is to lay the wing on the tissue and cut a piece large enough to cover the bottom surface of one side. Tissue has a "grain" and its maximum shrinkage is always at right-angles to this grain. It is generally advisable to have the shrinkage spanwise so as to prevent undue "sag" between the ribs. Therefore, make sure that your grain runs *across* the wing: i.e., from leading to trailing edge. Also, be sure to cut the tissue with about 1/2 in. surplus margin.

Have your work table cleared of everything except the items essential to the job: tissue, good sharp razor blade, tissue adhesive and, of course, the wing. With your first piece of tissue cut to size, apply paste to the

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framework. Paste the tip first, then the trailing edge, then root (center) rib and leading edge. *Do not* apply adhesive to any of the other ribs

Now carefully lay the tissue over the panel and gently pull it out spanwise. Next, draw the tissue across the chord at the center of the panel. Finally, work toward the four corners, carefully easing out the wrinkles and folds.

Do not press the tissue too firmly onto the framework until you have it pulled out to your complete satisfaction. The advantage of Kodak paste is that it just tacks the covering as you work, thus enabling any part to be unstuck, if a wrinkle should appear, and stuck down again after the wrinkle has been pulled out.

Don't try to pull the covering drum tight. It will become tight with subsequent shrinking and doping. Simply concentrate on getting the tissue applied *evenly* without any bad wrinkles.

The surplus tissue may now be trimmed off and the raw edge stuck down. Cover the other wing panel in the same way and then the two upper surfaces. When dealing with the top surfaces, it is generally easier to cover the tip separately with a small piece of tissue between the tip rib and the edge of the wing tip itself. Finally, cut two strips approximately 1-1/4 in. wide and apply to the center section.

For shrinking and doping, it is essential to have a true, flat surface on which the wing can be pinned so as to prevent warping. If your building board is not entirely free from warps, select a short piece of board that is. You will also need about a dozen scraps of sheet balsa, about 1/2 in. by 1/4 in. and 3/32 in. or 1/8 in. thick.

Some expert modelers, long practised in the art of tissue covering, do not use watershrinkage, but, generally, it is advisable for the beginner to watershrink before doping. For this, you will need a simple spray, either an old perfume spray or a simple mouth type spray.

Spray the underside of one wing panel first. The tissue will be seen to go quite slack. Using six of the small scraps of balsa under the wing to hold the wet tissue from contact with the board, pin it down, using six more scraps on the top surface. Now water-spray the top of the wing.

After a while the covering will dry out. It may not be completely tight, but this does not matter. Repeat the procedure with the other wing panel.

The same system of pinning down is adopted when doping. Dope has two purposes: to pull the covering tight over the framework and to make it airproof. Make sure that the covering is absolutely dry (following the watershrinking) before applying dope, otherwise you will find ugly white "blush" marks appearing on the covering when dry.

Apply the dope with a soft doping brush and do not go back over any part previously covered as dope soon becomes tacky. Again, the tissue will go slack, but when dry, you will see that it has become tight and strong and that, as a result, your wing is now quite rigid.

The longer you leave your wing panels pinned down, the better. So, though you may be tempted to fit the wing as soon as it is dry and go out and fly the model, it is much wiser to leave it undisturbed for a day or two, or, at least, overnight.

While waiting for the wing panels to dry, you can apply a couple of coats of dope to the fuselage (and to the prop if a balsa one is used). This will make the surface of the wood more durable. *Do not*, however, dope the rudder or stabilizer as these are likely to warp if so treated.

The model is powered with four strands of 1/8 in. rubber. Make this up into a loop

from a piece 38 in. long. Fit the wing to the wing platform with a long rubber band (or two bands joined together) through the motor slot, over the wing and onto the peg on each side of the fuselage.

Ready for flight, the model should balance on the finger tips when supported beneath the wing center spar. If the model is slightly nose heavy, the wing can be moved forward fractionally on its mount to compensate for this. If it should be tail heavy, move the wing back. If the balance point (center of gravity) is badly out, it will be necessary to add a small amount of clay to the nose or tail, but this will not be necessary if you have built the model accurately.

Hand-launch the model gently into the wind to test its glide. Move the wing slightly if it shows nose- or tail-heavy tendencies. Next, wind 50 turns on the motor and try again, then 100 turns. On 100 turns, the model should climb up to 15 ft. or so and fly a distance of 100 to 150 ft. You will now be able to see whether it flies in the desired direction. Gently bend the rudder, after breathing on it, if the model turns too sharply to one side.

On anything more than 100 turns, the model will rise off ground. You will probably find that 300 turns will give you a very satisfactory flight, with a minimum of time spent on rewinding. Actually, the motor, if properly treated with rubber lubricant, will take many more turns than this, but the life of the rubber is greatly extended by not winding to the maximum.

Take your time in building Tufnut. In return, you will have a model that will give you hours of fun and provide you with the necessary experience for tackling more advanced models.

One piece medium soft balsa 15 x 2 x 1/4 for fuselage; one piece medium balsa 12 x 3 x 1/32 for tail surfaces; one piece medium balsa 12 x 2 x 1/16 for ribs, wing-platform, etc.; one piece medium balsa 4 x 2 x 1/8 for tips, etc.; one strip trailing-edge stock 20 x 3/8 x 1/8; one strip medium balsa 20 x 3/16 x 3/16 for leading edge; one strip medium balsa 20 x 1/8 x 1/8 for center spar; 12 in. 1/32 steel wire for landing gear and propshaft; 1/2 in. brass tube and two washers to fit above; 2 in. 3/32 hardwood dowel; one pair 1 in. hardwood or plastic wheels; one 8 in. or 7 in. dia. plastic or balsa prop; 38 in. 1/8 in. flat rubber; one sheet model tissue; one tube model cement; one small bottle clear dope; one small bottle rubber lubricant. END

## For the RC Fan

*(Continued from page 24)*

actuator (elevator) to move from the "off" to the "on" position; 4. the impulse is of a certain fixed duration regardless of how long the transmitter signal is "on" or "off" during a given cycle because the time required for the electrical field to collapse in the rudder actuator is constant (this is the feature which makes it possible to give simultaneous operation of the two controls); 5. as the rate of the proportional control is increased, the impulses to the second control increase for a given length of time; 6. if the rate is increased enough, the impulses will blend together so that a full "on" control is being given; 7. if the rate is decreased sufficiently, the time between the "on" impulses will be so great that effectively full "off" control is being given; 8. for rates between the two limiting conditions, a proportionate control results.

Fig. 1-A is a diagram of the pulsed transmitter signal which is giving neutral rudder on the first control, equal "on" and "off" at a slow rate. Fig. 1-B shows the impulses which are generated in the rate circuit in the model and give a down-elevator signal to the second actuator. Note that the duration of the impulse is designated $t_0$ (equals 0.1 sec) and the dwell "off" time between impulses is $t_1$ (equals 0.4 sec). The length of $t_0$ is assumed to be always the same and the impulse always occurs when the transmitted signal goes "off." Also, $t_0$ and $t_1$ add up to 0.5 seconds or the length of one complete "on-off" cycle pulsed on the transmitter. Since $t_1$ (up-elevator) is much greater than $t_0$ (down-elevator), this rate corresponds to some degree of up-elevator control. Fig. 2-A shows the transmitter signal being pulsed at a faster rate than for Fig. 1-A, but neutral rudder is still being given. Fig. 2-B shows that $t_0$ is still equal to 0.1 seconds. This rate corresponds to neutral elevator. Fig. 3-A shows the transmitter being pulsed at twice the rate (0.1 sec per cycle) as for Fig. 2-A, but with equal "on" and "off" periods so that the rudder is still effectively neutral. In this case, $t_0$ is still equal to 0.1 seconds so that $t_1$ must be zero. Therefore, a continuous elevator down signal is being given at this rate of pulsing.

Fig. 4-B shows the original signal Fig. 4-A

modified to give a longer "on" than "off" signal so that effectively right rudder is being given. Fig. 4-C shows that $t_0$ still equals 0.1 seconds and $t_1$ equals 0.4 seconds and that $t_0$ plus $t_1$ still equals 0.5 seconds. This demonstrates that, although the pulse length signal has been changed, the rate signal is unaffected and that the elevator signal remains the same regardless of the rudder signal. As noted in Figs. 1 through 3, the rudder signal is unaffected by the rate.

It is important to note that full "off" or full "on" cannot be given for a rudder control inasmuch as these signals correspond to a zero rate which produces a full up-elevator signal. However, a rudder signal with an "on" to "off" ratio of 10:1 or 1:10 will give practically full right or left control and should not affect the rate signal.

An obvious additional item to incorporate as a fail-safe feature is a motor cut-off device which will function only when the rudder and elevator remain in the full "off" position for a period longer than at least one cycle of the pulsed transmitter signal. This can be accomplished by means of two sets of contacts connected in series, one on the rudder and one on the elevator or interconnecting the unused relay contacts on the first and second relays so that when both are closed for the required time, a time delay device cuts the motor.

The discussion thus far has been directed toward explaining the principles of obtaining the second control; the method of getting the rate impulse will now be discussed. Once the principles are understood, there are several methods of obtaining the desired impulse which come to mind. The device which is the most simple mechanically (because it is electrical) and therefore possesses a high degree of reliability, is the diode-condenser circuit which was developed and has proved to be very successful. The actual application of the diode has been used by some builders, but for a different purpose, that of spark suppression on the relay contacts for the escapement or solenoid-type actuators. The principle of spark suppression is to tap off the electrical energy which was stored in the magnetic field of the escapement or solenoid coil so that it cannot jump across the relay contacts, causing pitting or erosion. You will note that this spark always occurs when the contacts are opened. By using the diode-condenser circuit, we not only do a very good job of suppressing the undesirable spark, but we put it to work to furnish the necessary electrical current to pull in the second relay. The circuit for this device is shown in Fig. 5. As indicated by the diagram, it is a very simple circuit, consisting of a diode and condenser connected in series directly across the two ends of the coil in the actuator for the first control. A 5,000 to 10,000 ohm relay is connected across the condenser and the polarity of the batteries for the first actuator and the diode are such that when the contacts of the receiver relay are closed, current does not flow through the diode.

The actual operation of the device is as follows: 1. the receiver relay pulls in, causing current to flow through the first actuator circuit (Fig. 5-A); 2. the diode acts as a check value, preventing the current from flowing through the diode, condenser and second relay; 3. the receiver relay drops out when the transmitter is cut off, causing the current to stop; 4. the flux or magnetic field in the coil collapses, generating a secondary current, which flows in the same direction through the coil, but can pass through the diode because the voltage across the diode is now of the opposite polarity (Fig. 5-B). This voltage is many times larger than the voltage in the actuator circuit as demonstrated by the fact that you can get quite a kick if you hold the contacts when they break; 5. the energy which was in the magnetic flux of the first actuator is transferred into the condenser, which becomes charged; 6. the second control relay coil permits this charge to drain off after the impulse has ceased. This drain or current is initially large and sufficiently strong to pull in the second relay and operate the second control actuator; however, the current drops off fairly rapidly and the drop-out value for the relay is reached very quickly; 7. the actual duration of the pull-in time is dependent on several factors, such as the first actuator voltage and resistance, condenser size and second control relay adjustments. The desired pull-in time can be very easily adjusted by changing the relay spring tension and the contact clearances.

The values or sizes of the various components as given in Fig. 5 are those which have worked satisfactorily in our specific application. There is quite a bit of room for variation from these values and tests should be made to get the proper matching. Normal pulse rates have been in the order of two to ten cycles per second and can be obtained by changing the spring tension on the second relay. Because of a charging effect in the condenser, it is possible to set the relay so that it does not pull in for the lowest pulse rates. This makes it possible to obtain full up-elevator and still maintain a definite pulse rate to keep the rudder pulsing. The difference in the pull-in and drop-out values for the relay are determined by the contacts on the relay and should be made as small as possible. To overcome any difficulties caused by vibration, the receiver and relays should be shock-mounted in sponge rubber on rubber bands.

Almost any type of solenoid actuator, such

as the Trammel or Adams, on Southwest units, will work the rate system when used for the first control or rudder control. An electric motor type of actuator, however, will not work. The values or sizes of the various components in the rate or second control circuit will have to be adjusted for each specific application. Any type of actuator will work in the rate or second control circuit since its operation does not influence the rest of the circuit.

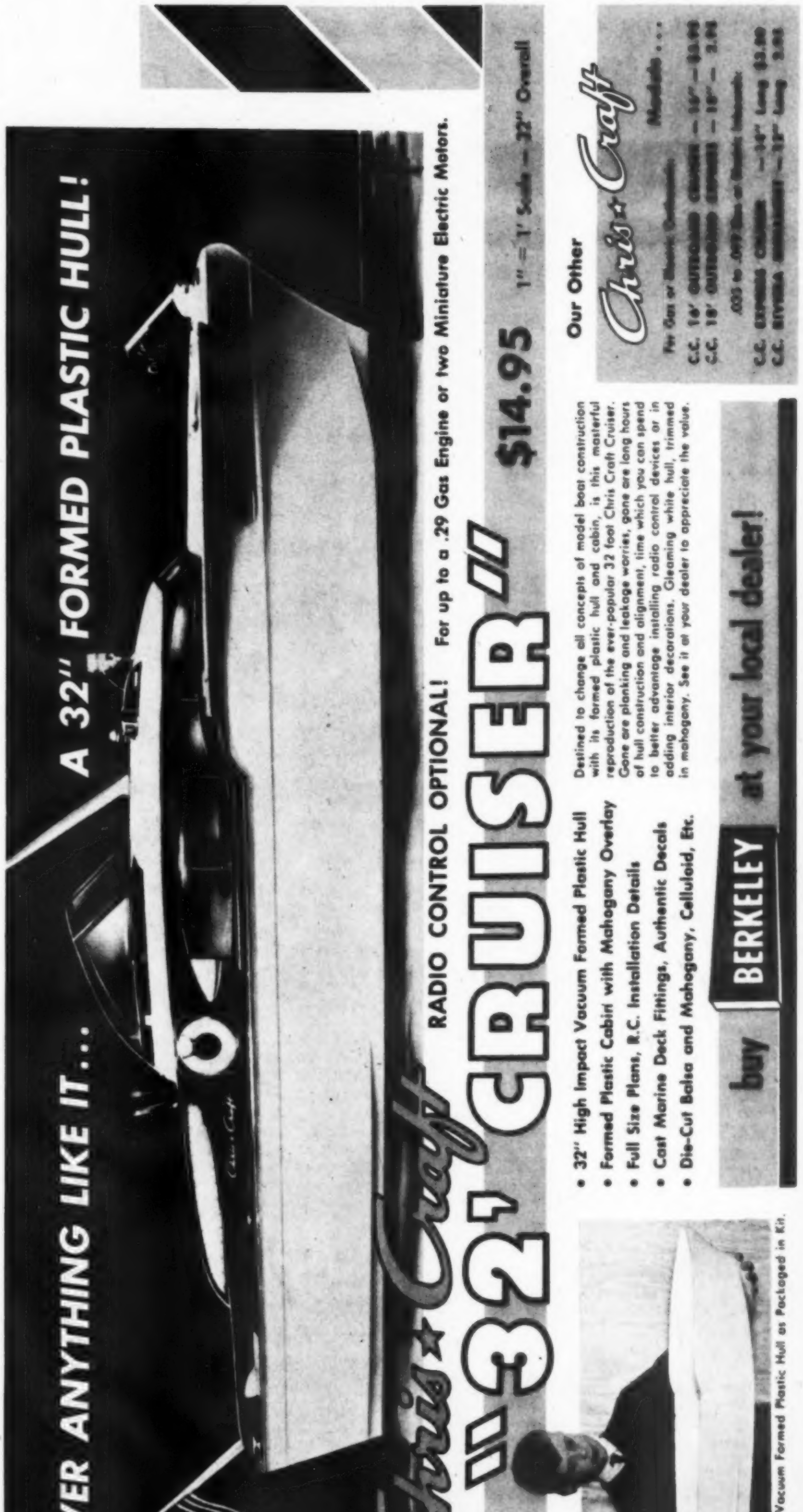
A discussion of a control system is only half complete without fully describing the control box. As a matter of fact, it was the control box which gave the most difficulty in developing the system. Several months were spent in getting a reliable control box.

From the previous discussion it can be seen that the control box must offer a means of varying the pulse length and pulse rate signals, either together or separately without interaction. This can be done either with a single control stick or two separate sticks. The single stick is preferred. In either case, lateral motion of the stick should carry the pulse length or rudder control and, fore and aft, motion should vary the pulse rate or elevator control.

A description of the general arrangement and details of the control box will be given but the design of a specific control box will be left for the individual builder. It is felt that most builders will either have pulsers which can be modified or will be able to build up a unit of their own design with spare parts they have lying around.

Two general observations which have guided the design of the control box will be mentioned. The first is that a flat spiral type of insulated cam which pushes two separate contacts closed is preferable to the drum type of half-insulated/half-contact cam which makes a sliding contact with a single contact. The flat cam is more compact than the drum and the sliding contact is susceptible to arcing, which gives erratic rate signals. The second comment is that a variable rheostat to change the speed of the pulser motor is unsatisfactory for this control system because the speed tends to change erraticaly because of changes in friction or battery voltage and the speed also lags behind the rate signal commands from the flier. A centrifugal governor which interrupts the power to the motor by use of spring load contacts is used in place of the rheostat to control the pulsing rate. The rate controlled by the governor, which is shown in Fig. 6, is very stable and precise and does not vary with the attitude in which the box is being held, friction changes, or the voltage of the motor batteries. The response to rate signal commands from the flier is practically instantaneous because the governor applies either full voltage or zero voltage to the motor until the desired speed or rate is achieved.

The general arrangement of the control box is shown in Fig. 7. A 1½ to 6 volt electric motor drives the camshaft through a gear reduction unit of about 5:1 to 10:1. The flat spiral cam is made of insulating material, such as bakelite, and cut to the shape indicated in Fig. 8. The cut out and lobe on the cam are to insure that the signal is always keyed "on" or "off" for each cycle of the cam regardless of whether the stick is moved to the full left or right position. The keying contacts which are attached to the control stick move in a plane parallel to the cam and are set normally with a small gap. As the cam rotates (note the directions of rotation of the cam), the inner contact strikes the cam at the spiral portion and is forced against the outer contact. The inner contact drops off the radial cut of the cam and breaks contact with the outer contact as the cam rotates further. The ratio of the "on" to "off" signal for a given cycle is dependent on the angular position of the control stick



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as indicated by the diagram in Fig. 8.

The centrifugal governor which is attached to the motor shaft operates in the following manner: 1. as the motor shaft picks up speed, the flyweights tend to fly outward with an increasing force; 2. this force or push is transmitted to a set of spring loaded contacts, as indicated in Fig. 6, which open and close the drive motor circuit; 3. as the force increases, it reaches a point where it overpowers the spring tension holding the contacts closed and opens the motor circuit; 4. this causes the motor to slow down quickly until the flyweight force on the contact is less than the spring tension, at which point the contacts reclose; 5. the motor "on - off" cycle is repeated at such a fast rate that the speed of the motor is essentially constant. The motor speed at which the contacts open is varied by changing the spring tension on the contacts by means of the spring attached to the control stick, shown in Fig. 7, which is free to pivot fore and aft. An additional spring attached to a trim screw may be included to provide a means of changing the trim speed or the pulse rate for neutral or for trimming the elevator control.

The control stick is provided with centering springs which hold the stick in the neutral position, as shown in Fig. 7. It should be noted that these springs are of the preloaded type which require a definite force to move the stick from neutral. This type of centering gives the flier a "feel" of the neutral position and forces the stick always to return to the same neutral position when released, regardless of the friction on the stick or the torque on the stick caused by the cam's striking the contacts.

A double-pole, double-throw switch is used as the main switch for the motor and keying contacts and a push button switch is also used to provide a means of pulsing the transmitter manually in case the pulser fails. Note that since the pulser may stop with the contacts closed, the main switch should be turned off when using the "panic" push button.

The contacts for the motor speed governor can be very easily obtained from a discarded relay. In this case, an old Sigma 4F relay was used with the coil removed. An excessive voltage on the motor should be avoided to keep arcing of the governor contacts to a minimum.

The proper voltage will be sufficient to run the pulser at a rate only slightly higher than the highest desired rate. If the points tend to erode, a spark suppression circuit similar to that employed to detect the pulse rate signal in the model could be used with the relay replaced by a fixed resistor. END

## Pen Pals

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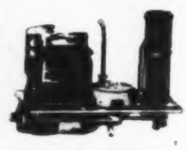

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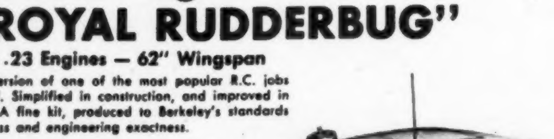


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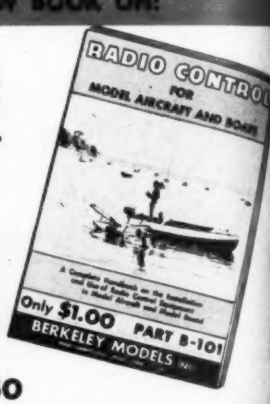


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STINSON VOYAGER "150"
34" Wingspan
Equipped with wing slots, this authentically detailed model flys with the best. Designs in this series have been chosen for performance.
$1.95
FAIRCHILD 24 "RANCHER"
36½" Wingspan
Largest in the series is the never to be forgotten Fairchild. Stable, strong, detailed, it is ideal for contest experimentation.
$1.95
AERONCA SEDAN
34" Wingspan
Featured as a landplane, plans show pontoon details for those desiring the added thrill of water take-offs. Finished model is really spectacular.
$1.95
CULVER "V"
29" Wingspan
This low-wing sport plane turns in long stable flights. The tricycle landing gear adds realism to landings.
Kit $3.95
U.S ARMY
22540
Here is the model designed to use radio control devices that will be available in the next few years. The Helioplane is the first model that permits the use of the scale flaps giving true two-speed flight.
Army Liaison YL-24 "HELIOPLANE"
Variable Camber Wing for Two-Speed Radio Control Flying!
38¾" Wingspan—1" Scale
For .049 to .14 Engines
Slotted flaps may be depressed 10 degrees for Free-Flight, depressed 25 degrees for slow speed radio control flying; or raised 5 degrees for high speed flight.
buy BERKELEY at your local dealer!
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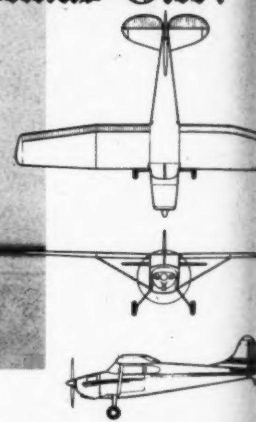
# R.C. FLYING SCALE

## Ideal as a Christmas Gift!

**PRE-FABRICATED KIT INCLUDES:**

- Full Size Plans with R.C. and PAA-Load Installation Details
- Sharply Die-Cut Balsa
- Formed Metal Landing Gear
- Hardware
- Covering Material
- Die-Cut Celluloid
- Mahogany Motor Mounts
- Authentic Full Color Decals
- Die-Cut Mahogany Plywood
- Pre-Fabricated Block Balsa
- Selected Strip Balsa
- Pre-Fabricated Wing Edges



Berkeley's

**Designed by: Henry Struck**

**$9.95**

## CESSNA "170"

**For Radio Control — Free-Flight — PAA-Load**

**For .25 to .35 Engines — 72" Span — 2" Scale**

Controlling your "170" by Radio is a thrill you will never forget! Perfect scale, rugged, stable in all attitudes, yet responsive in control with good wind penetration qualities. Gear location is ideal for extended take-off runs, while its larger size makes it less sensitive to turbulent air. A large cabin makes extra radio installations easy.

The plans include a wealth of scale details which will appeal to the master craftsman. Inexperienced builders will find construction simplified by the full size plans, sketches and assembly technique.

Inspect the "170" and its many features at your dealer. Study its design, examine the material, and visualize its performance on the contest field.

# R.C. AMPHIBIAN...

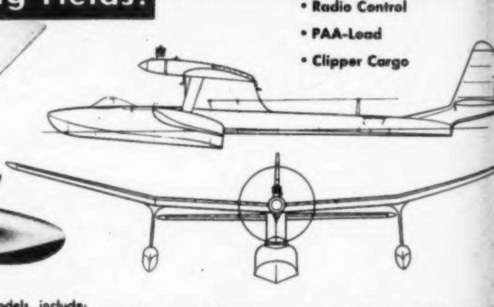
**Fly it on Ponds—Rivers—Bays—Lakes or Flying Fields!**

**Fly it Five Ways:**

- Seaplane (R.O.W.)
- Landplane (R.O.G.)
- Radio Control
- PAA-Load
- Clipper Cargo

- Detailed Full Size Plans
- Shaped Leading, Trailing Edges
- Die-Cut Balsa and Plywood
- Celluloid Bubble Canopy
- Metal Ring Cowl
- Hardware, Covering Materiel
- Selected Strip Balsa

**$7.95**



## Henry Struck's "SEA-CAT"

**N.A.C.A. Type Planing Hull Amphibian**

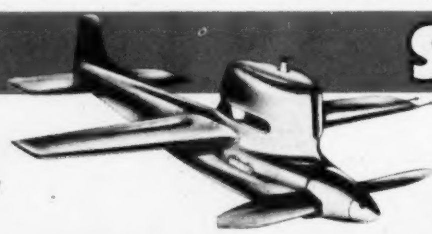
**For .15 to .25 Engines — 68" Wingspan**

Proven performance on the original test models include: First International Radio Control Flight; Fourth place in a field of seventy in the Mirror Flying Fair (The first R.C. contest for both Struck and the "Sea-Cat"); First in Radio Control at Screamin' Demons Long Island Sound Hydro Championship; Second in PAA-Load at the same contest; and Precision flights carrying over a pint of fuel at the First "World Model Air Olympics."

### First All-Purpose Gas Model

Here is a model design that has been a full thirteen years in development. It's N. A. C. A. Planing Hull design makes water take-offs easy. Its hull is easily accessible for radio control equipment, PAA Dummy Pilot or Clipper Cargo.

# SUPER SPEED...



**Each Kit Contains:**

- Formed Aluminum Wings
- Carved and Hollowed Body
- Jim Walker "U-Control"
- Plywood Tail Assembly
- Shaped and Drilled Bonnet
- All Necessary Hardware
- Full Size Detailed Plans

**Designed by: Bob Elliot**

The "Mini and Super Whirlaway's" are Berkeley's newest competition speed designs. Minimum frontal area, light weight design, correct angular set-up, balance and area, plus mirror-smooth aluminum wings combine to give you a design that flies fast low and level toward the hardware.

## SUPER WHIRLAWAY "A-B"

For .19 to .29 Engines—12½" Wingspan

**$4.95**

## MINI WHIRLAWAY "½A"

For .049 Engines—8¼" Wingspan

**$2.95**

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Span: 43"

# Jim Walker
# FIRECAT

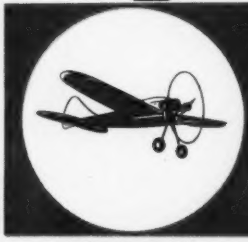
## *Stunt, Precision, Combat Plane*

It's Big...it's Beautiful...a dream to fly...a cinch to build. Without workshop or special tools you can have the "Firecat" flying in little more than an hour after you open the box. Here's why:

### WE DO THE WORK—YOU HAVE THE FUN

**You've never seen a kit so complete. Everything is furnished but engine and tank. All parts are pre-formed, rounded, smoothed and sanded—not just stamped out of wood! Slip together with cement, dope and start flying! Wheels, canopy, push-rod, bell crank, wires and hardware included. *Get it at your hobby dealer's.***

**$4.95**



**"FIREBABY"**

Span 19". Comes ready to fly, with flying lines and instructions .........$2.50

With engine ........$7.50

**Watch for the "FIREBEE" Coming Soon!**

**Jim Walker** **A-J AIRCRAFT CO.**

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***World's Largest Manufacturer of Ready-to-Fly Model Planes***